Operator's Safety and Service Manual

GPR78

This manual covers the following serial numbers and higher for each model listed:

GPR78.....7800110

VIBRATORY PLATES

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Table Of Contents

Safety Information 1

Introduction 1
Safety Precautions 1
Safety Decals 1
Safety Decals: GPR78H (Decal Set #16031) 3

Specifications. 4

Operation 5

Introduction 5
Before Starting & Operating 5
Engine. 5
Starting Gasoline Engine 5
Starting Diesel Engine 5
Operating 5
Stopping Engine 6
Lifting/Transporting 6

Maintenance 7

Maintenance Schedule 7
Fluid Levels. 7
Engine Maintenance 7
Engine Speed 7
Belt Adjustment. 7
Checking Hydraulic Fluid 8

Service 9

Torque Chart 9
Service Tools 9
Main Disassembly Procedure (Diesel Engine) 9
Main Disassembly Procedure (Gasoline Engine) . . . 10
Exciter Oil Change Procedure 10
Lower Hydraulic Seal Replacement 10
Bleeding And Adjustment of Hydraulic Controls. . . . 11
Base plate Disassembly Procedure 12
Handle Disassembly Procedure 13
Control Head Disassembly Procedure 13
Base plate Assembly Procedure 14
Control Head Assembly Procedure 16
Handle Assembly Procedure 17
Final Assembly 17
Troubleshooting 18
Parts Replacement Cycles and Tolerances 19

Replacement Parts 20

Main Assembly 22
Handle Assembly 24
Base Plate Assembly 26
Control Head Assembly 28
Gasoline Engine Assembly 30
Diesel Engine Assembly. 32

Warranty 34

⚠ WARNING ⚠

CALIFORNIA PROPOSITION 65 WARNING

Engine exhaust and some of its constituents are known in the state of California to cause cancer, birth defects, and other reproductive harm.

SAFETY INFORMATION

Introduction

This Safety Alert Symbol is used to call attention to items or operations which may be dangerous to those operating or working with this equipment. The symbol can be found throughout this manual and on the unit. Please read these warnings and cautions, along with all decals, carefully before attempting to operate the unit. Make sure every individual who operates or works with this equipment is familiar with all safety precautions.

⚠ WARNING ⚠

GENERAL WARNING. Indicates information important to the proper operation of the equipment. Failure to observe may result in damage to the equipment and/or severe bodily injury or death.

⚠ CAUTION ⚠

GENERAL CAUTION. Indicates information important to the proper operation of the equipment. Failure to observe may result in damage to the equipment.

Safety Precautions

LETHAL EXHAUST GAS: An internal combustion engine discharges carbon monoxide, a poisonous, odorless, invisible gas. Death or serious illness may result if inhaled. Operate only in an area with proper ventilation. NEVER OPERATE IN A CONFINED AREA!

DANGEROUS FUELS: Use extreme caution when storing, handling and using fuels, as they are highly volatile and explosive in vapor state. Do not add fuel while engine is running. Stop and cool the engine before adding fuel. DO NOT SMOKE!

SAFETY GUARDS: It is the owner's responsibility to ensure that all guards and shields are in place and in working order.

IGNITION SYSTEMS: Breakerless, magneto, and battery ignition systems can cause severe electrical shocks. Avoid contacting these units or their wiring.

SAFE DRESS: Do not wear loose clothing, rings, wristwatches, etc. near machinery.

NOISE PROTECTION: Wear OSHA specified hearing protection devices.

EYE PROTECTION: Wear OSHA specified eye shields, safety glasses, and sweat bands.

FOOT PROTECTION: Wear OSHA specified steel-tipped safety shoes.

HEAD PROTECTION: Wear OSHA specified safety helmets.

DUST PROTECTION: Wear OSHA specified dust mask or respirator.

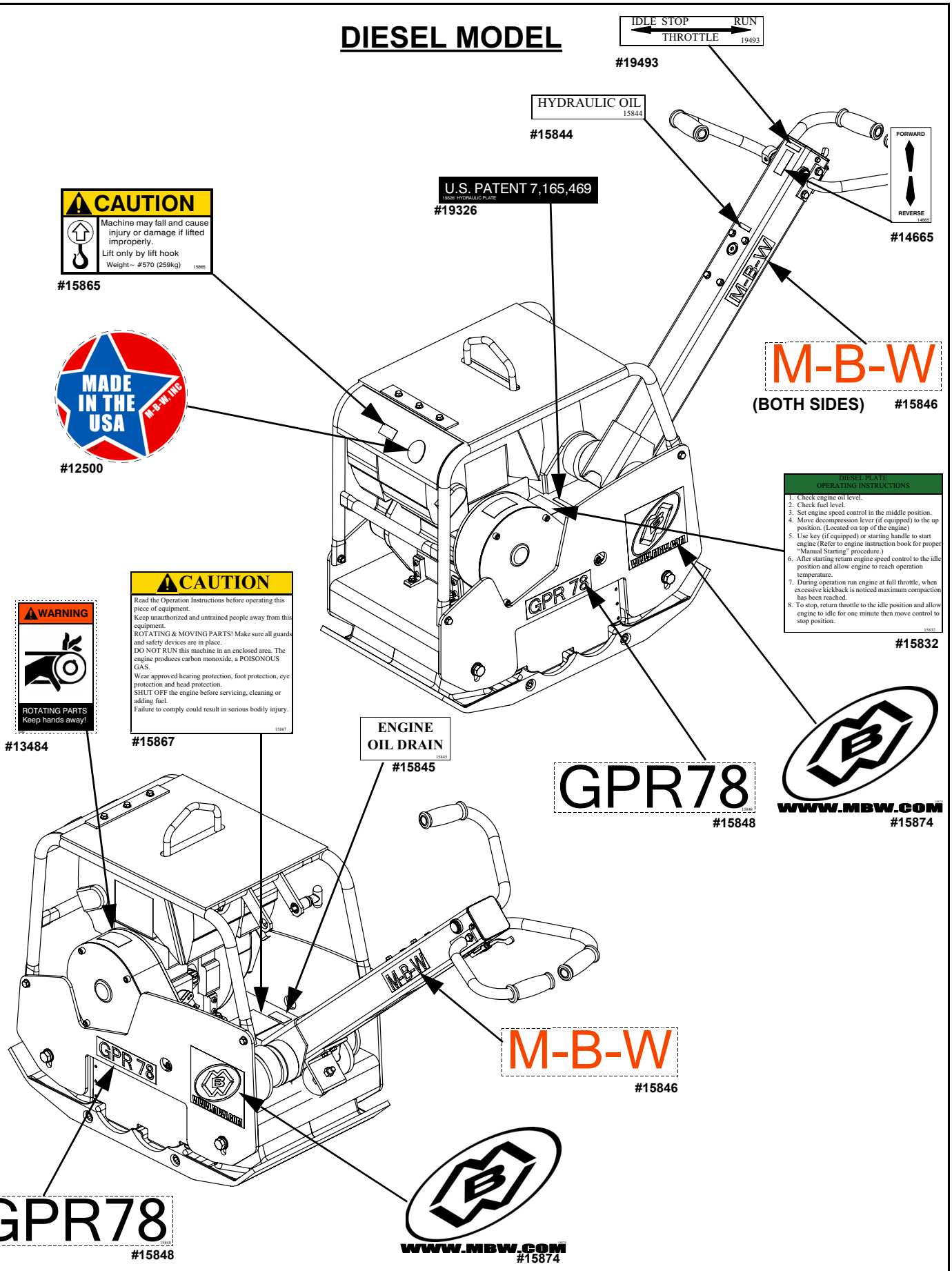
OPERATOR: Keep children and bystanders off and away from the equipment.

REFERENCES: For details on safety rules and regulations in the United States, contact your local Occupational Safety and Health Administration (OSHA) office. Equipment operated in other countries must be operated and serviced in accordance and compliance with any and all safety requirements of that country. The publication of these safety precautions is done for your information. MBW does not by the publication of these precautions, imply or in any way represent that these are the sum of all dangers present near MBW equipment. If you are operating MBW equipment, it is your responsibility to insure that such operation is in full accordance with all applicable safety requirements and codes. All requirements of the United States Federal Occupational Safety and Health Administration Act must be met when operated in areas that are under the jurisdiction of that United States Department.

Safety Decals

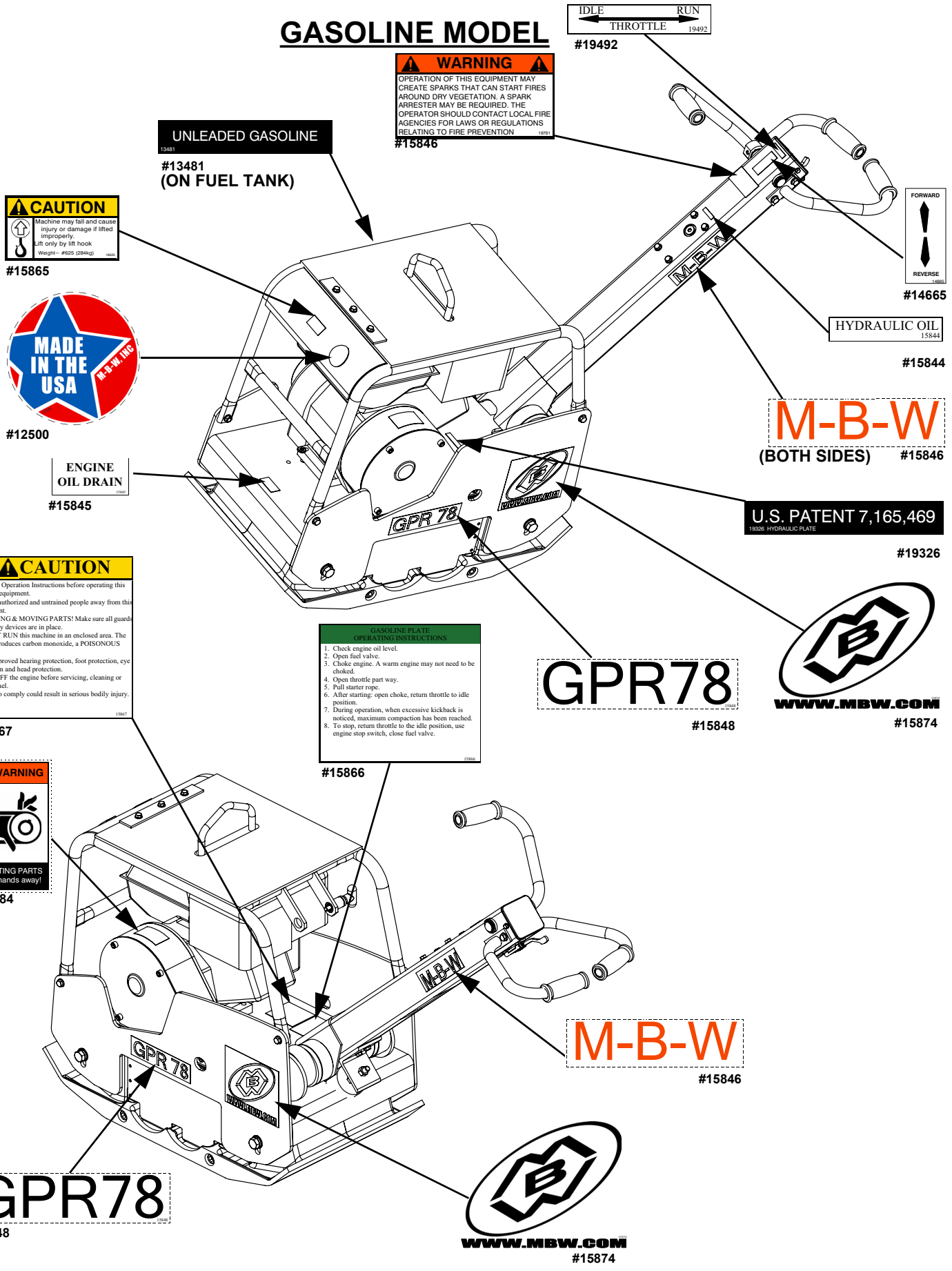
Carefully read and follow all safety decals. Keep them in good condition. If decals become damaged, replace as required. If repainting the unit, replace all decals. Decals are available from authorized MBW distributors. Order the decal set listed on the following page(s).

DIESEL MODEL



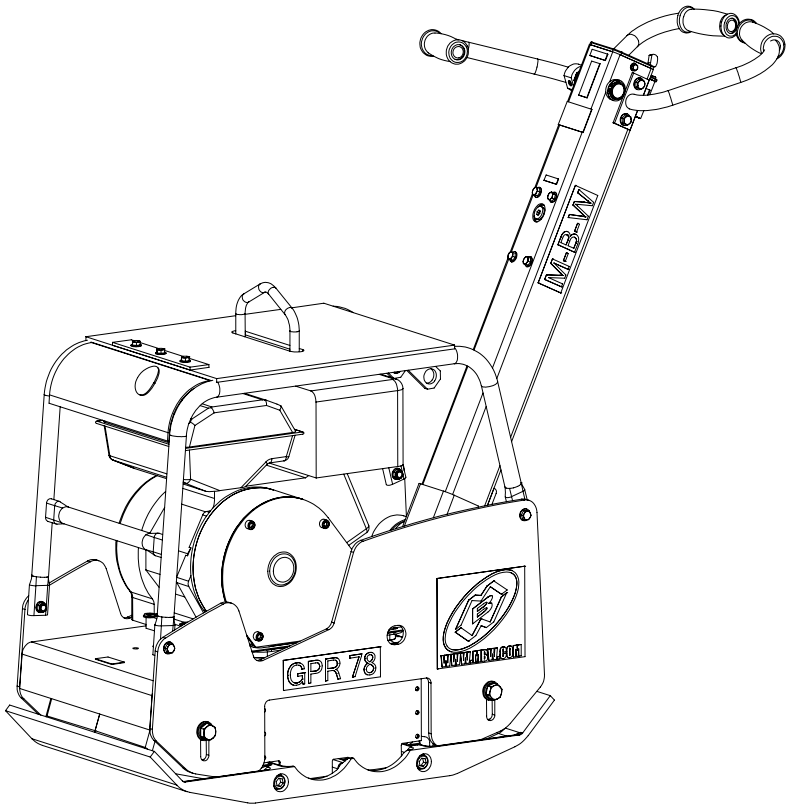
Safety Decals: GPR78S (Decal Set #16031)

GASOLINE MODEL



Safety Decals: GPR78H (Decal Set #16031)

SPECIFICATIONS



	GRP78H	GPR78D
CENTRIFUGAL FORCE	7875 lbf (35 kN)	7875 lbf (35 kN)
EXCITER (VPM)	4080 vpm	4080 vpm
TRAVEL SPEED	82 ft./min. (25 m/min.)	82 ft./min. (25 m/min.)
COMPACTION DEPTH	22 in. (56 cm)	22 in. (56 cm)
WIDTH x LENGTH	17.7 X 32.3 in. (45 X 82 cm)	17.7 X 32.3 in. (45 X 82 cm)
OPERATING WEIGHT	522 lb (237 kg)	567 lb (257 kg)
ENGINE	Honda GX270 16.5 in.Š (270 cmŠ)	Hatz 1B30 21.2 in.Š (347 cmŠ)
FUEL	Gasoline	Diesel
ENGINE SPEED	3600 rpm	3600 rpm
STARTER SYSTEM	Recoil	Recoil
PLATE EXTENSIONS	3 in. (7.6 cm) 40lb (18 kg)	3 in. (7.6 cm) 40lb (18 kg)

Specifications subject to change without notice.

No universal method or formula has been accepted for determining “Compaction Force”. All manufactures employ their own method or formula.

OPERATION

Introduction

MBW equipment is intended for use in very severe applications. They are powered by four cycle engines and are available in different sizes and a selection of engines.

The MBW Reversible Plate Compactor is intended to compact various soil types. Recommended soil types include granular soils, gravel/sand mixtures, and semi-granular cohesive soils.

The MBW Reversible Plate Compactor is not recommended for use in cohesive soils nor for very hard surfaces such as concrete or asphalt.

This parts manual contains only standard parts. Variations of these parts as well as other special parts are not included. Contact your local MBW distributor for assistance in identifying parts not included in this manual.

Before Starting & Operating

After receiving your new MBW Inc. Reversible Plate Compactor, inspect it for any visible damage done during shipment. Make sure the engine throttle works properly. Contact your nearest MBW Inc. Distributor if there are any problems.

Your new MBW Inc. Reversible Plate Compactor is shipped complete and ready for use.

- REMEMBER! It is the owner's responsibility to communicate information on the safe use and proper operation of this unit to the operators.
- Review ALL of the Safety Precautions listed on page 1 of this manual.
- Familiarize yourself with the operation of the machine and confirm that all controls function properly.
- Know how to STOP the machine in case of an emergency.
- Make sure hands, feet, and clothing are at a safe distance from any moving parts.
- OIL LEVEL - Check the oil level in the engine. For more information see "Lubrication" under the respective engine's "Owners Manual" or the Maintenance section of this manual.
- AIR CLEANER - Check to ensure element is in good condition and properly installed.
- FUEL SUPPLY - The engines on MBW Inc. compaction equipment require an automotive grade of clean, fresh, diesel fuel or unleaded gasoline dependent on engine type. (See Engine "Owner's Manual")
- FUEL FILTER - If clogged or damaged, replace.

Engine

Refer to the engine manual for location of all controls and features.

Starting Gasoline Engine

1. Open fuel valve.
2. Turn engine switch to "ON" position.
3. Set throttle to idle position.
4. Choke engine if necessary (you may not need to choke a warm engine).
5. Pull starter rope repeatedly until engine starts.
6. Move choke lever to off or open position.
7. Allow engine to warm up for one or two minutes.

Starting Diesel Engine

For detailed instructions refer to the engine Manual.

1. When starting the engine, the throttle lever on the handle must be in the idle position.
2. The engine has an automatic decompression system, however it is recommended to slowly pull the starter rope until you feel a slight resistance. Let the starter rope recoil completely and pull the starter rope quickly.
3. Let the engine warm up in the idle position for one or two minutes.

Operating

1. After the engine warms up, fully open throttle.
2. The compactor will begin vibrating and moving in a forward direction. **Never leave compactor idling unattended.**
3. The MBW Reversible Plate Compactor is designed to shift into forward automaticly when control lever is released. The number of passes needed to reach the compaction level desired will depend on soil type and moisture. Maximum compaction of the soil has been reached when excessive kickback is noticed in the compactor.

Stopping Engine

1. To stop the compactor from traveling forward, return the engine throttle to idle position.
2. Whenever possible, it is recommended to let the engine idle for one or two minutes before stopping.
3. Gas engines: Turn the switch on the engine to “STOP” position.
   Diesel engines: Move the throttle control to the “STOP” position.
4. Turn off the fuel valve where applicable.

Lifting/Transporting

1. Lift unit by center lifting eye on roll cage.
2. The unit must be transported in the upright position. DO NOT lay machine on its side.
3. Secure or tiedown unit using lift eye or roll cage when transporting.

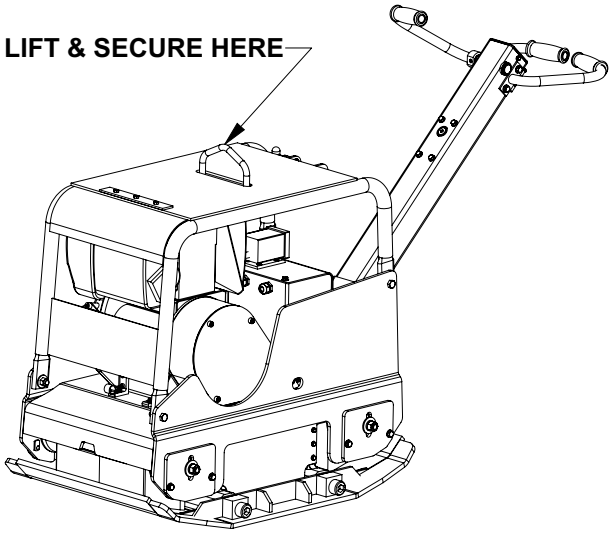
⚠ WARNING ⚠

Always stop the engine before:

Adding fuel.

Leaving the equipment unattended for any amount of time.

Before making any repairs or adjustments to the machine.



MAINTENANCE

⚠ WARNING ⚠

Always exercise the stopping procedure before servicing or lubricating the unit.

After servicing the unit, replace and fasten all guards, shields, and covers to their original positions before resuming operation.

⚠ CAUTION ⚠

Always verify fluid levels and check for leaks after changing fluids.

Do not drain oil onto ground, into open streams, or down sewage drains.

Maintenance Schedule

SYSTEM	MAINTENANCE	EACH USE	EVERY 50 HOURS	EVERY 100 HOURS	EVERY 250 HOURS	YEARLY
Engine	Refer to engine operator/owner manual	X				
	Clean cooling fins		X			X
Belt	Check for wear and retighten			X		
Exciter	Check for oil leaks	X				
	Change oil				X	X
	Tighten Bolts[1]		X			X
Hydraulics	Check level and refill			X		
Hardware	Check and tighten as needed[1]		X			X
Shockmounts	Check for cracks or tears		X			X

1. Check all hardware after the first 5 hours of use, then follow the maintenance schedule.

Fluid Levels

SYSTEM	FLUID VOLUME	RECOMMENDED OIL
Exciter	24 oz.	MBW Ground Pounder® Exciter Oil[1]
Hydraulic Oil	4 oz.	Chevron AW ISO or Rykon 32
Engine	Refer to engine operator/owner manual	

1. MBW #01058---- 6-Pack (8 oz. bottles)
   MBW #17320---- 1 quart (32 oz.)

Engine Maintenance

Refer to the engine owner's manual for maintenance intervals and procedures.

Engine Speed

1. Engine speed is factory set according to the speeds listed in the Specifications section of this manual. Do not tamper with the governor setting. The governor establishes safe operating limits which must not be exceeded.
2. Refer to the engine Owner's Manual for procedure on setting operating and idle speeds.
3. The engine operating speed should be set to 3600 RPM.
4. The engine idle speed must not exceed 1800 RPM. If the idle speed is greater than 1800 RPM the clutch may not disengage.

Belt Adjustment

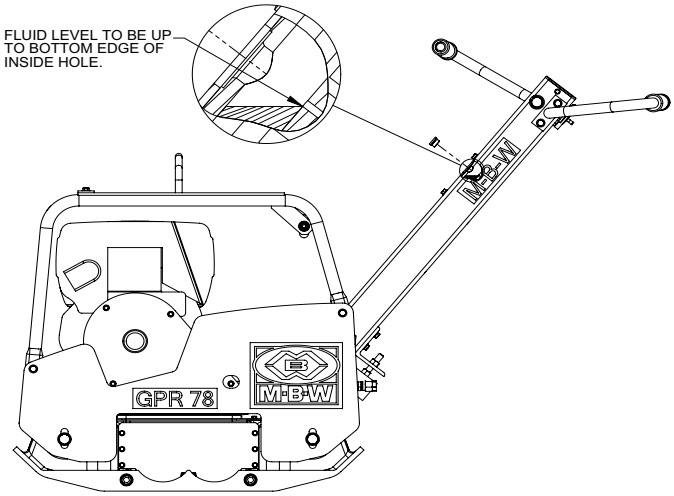
If any belt stretch develops follow these steps:

Refer to MAIN ASSEMBLY, page 22.

1. Remove the belt guard, refer to engine assembly pages.
2. Loosen **(do not remove)** the four hex head capscrews (#28) securing the engine deck to the base plate.
3. Tighten the belt by lifting the engine deck to provide 3/8 - 3/4 inch of “play” on one side of the belt. **Be sure to keep the engine deck level with the base plate when adjusting the belt.**
4. Retighten the four hex head capscrews (#28).
5. Reinstall the belt guard.

Checking Hydraulic Fluid

1. To avoid contaminating the hydraulic oil clean all dirt & debris from around the fill plug on handle.
2. Remove fill plug. With handle in operating position, oil level to be at bottom edge of inside hole as shown.



Assembly and disassembly should be performed by a service technician who has been factory trained on MBW equipment. The unit should be clean and free of debris. Pressure washing before disassembly is recommended.

- Prior to assembly, wash all parts in a suitable cleaner or solvent.
- Check moving parts for wear and failure. Refer to the Replacement section in this manual for tolerance and replacement cycles.
- All shafts and housings should be oiled prior to pressing bearings. Also, ensure that the bearings are pressed square and are seated properly.
- All bearings should be replaced when rebuilding any exciter or gearbox.
- All gaskets and seals should be replaced after any disassembly.

Torque Chart

SIZE	GRADE 2	GRADE 5	GRADE 8
1/4-20	49 in•lbs	76 in•lbs	9 ft•lbs
1/4-28	56 in•lbs	87 in•lbs	10 ft•lbs
5/16-18	8 ft•lbs	13 ft•lbs	18 ft•lbs
5/16-24	9 ft•lbs	14 ft•lbs	20 ft•lbs
3/8-16	15 ft•lbs	23 ft•lbs	33 ft•lbs
3/8-24	17 ft•lbs	26 ft•lbs	37 ft•lbs
7/16-14	24 ft•lbs	37 ft•lbs	52 ft•lbs
7/16-20	27 ft•lbs	41 ft•lbs	58 ft•lbs
1/2-13	37 ft•lbs	57 ft•lbs	80 ft•lbs
1/2-20	41 ft•lbs	64 ft•lbs	90 ft•lbs
9/16-12	53 ft•lbs	82 ft•lbs	115 ft•lbs
5/8-11	73 ft•lbs	112 ft•lbs	159 ft•lbs
5/8-18	83 ft•lbs	112 ft•lbs	180 ft•lbs
3/4-16	144 ft•lbs	200 ft•lbs	315 ft•lbs
1-8	188 ft•lbs	483 ft•lbs	682 ft•lbs
1-14	210 ft•lbs	541 ft•lbs	764 ft•lbs
1-1/2-6	652 ft•lbs	1462 ft•lbs	2371 ft•lbs
M 6	3 ft•lbs	4 ft•lbs	7 ft•lbs
M 8	6 ft•lbs	10 ft•lbs	18 ft•lbs
M 10	10 ft•lbs	20 ft•lbs	30 ft•lbs

CONVERSIONS

in•lbs x 0.083 = ft•lbs

ft•lbs x 12 = in•lbs

ft•lbs x 0.1383 = kg•m

ft•lbs x 1.3558 = N•m

Service Tools

Part No.	Description
17320	Ground Pounder® Exciter Oil
016129	Rubber Test Mat
16031	Decal Set

Main Disassembly Procedure (Diesel Engine)

Refer to Main Assembly, page 22 for disassembly.

1. Clean all visible debris from the machine before servicing.
2. Remove the four hex head capscrews (#29) securing the engine deck (#22) to the base plate (#4). Use caution as the engine deck will drop down.

Refer to Diesel Engine Assembly, page 32 Sections of this manual for belt guard & belt removal.

3. Remove the four socket head capscrews (#16) securing the belt guard (#5) to the mount plate (#10) on the engine (#7) and remove the belt guard.
4. Slide the belt (#3) off the clutch (#9).
5. Remove the two flange screws (#24) securing the bellows retainer (#13), and remove the retainer.
6. Push the lip of the bellows (#3) through the hole in the engine deck.
7. Disconnect the hydraulic line (#20) from the control head in the handle assembly. Keep the end of the hydraulic line and control head fitting free of dirt and debris by using tape. Remove tie strap holding hydraulic hose & throttle cable together. **Be careful to use a drain pan to catch the hydraulic oil.**
8. Use the main lift hook on the roll cage (#5) to separate the engine deck from the base plate. **Be careful to guide the hydraulic line through the handle assembly and engine deck as the subassemblies are separated to prevent damage to components.** If further disassembly of the engine deck is required proceed to step 9. If base plate service is required refer to the **Base plate Disassembly Procedure** section of this manual.
9. Disconnect the throttle cable (#21) from the engine.
10. Remove the handle assembly by removing the four flange screws (#35) securing the shock mount (#19) to the engine deck.
11. Remove the four hex head capscrews (#27) securing the roll cage to the engine deck and remove the roll cage.

Refer to DIESEL ENGINE ASSEMBLY, page 32.

12. Remove the four hex head capscrews (#13) securing the engine to the engine deck and remove the engine.

Main Disassembly Procedure (Gasoline Engine)

Refer to Main Assembly, page 22 for disassembly.

1. Clean all visible debris from the machine before servicing.
2. Remove the four hex head capscrews (#29) securing the engine deck (#22) to the base plate (#4). **Use caution as the engine deck will drop down.**

Refer to Gasoline Engine Assembly, page 30 Sections of this manual for belt guard & belt removal.

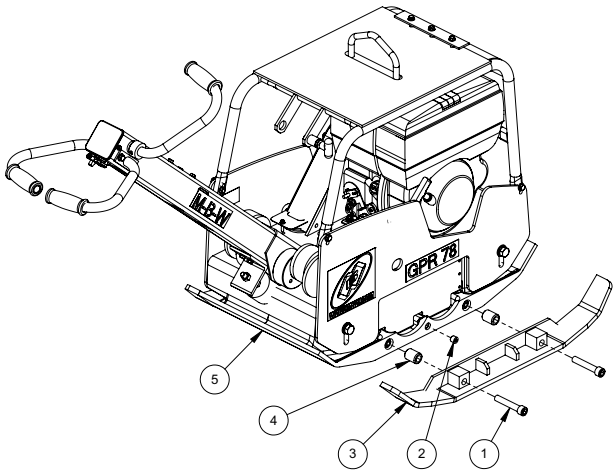
3. Remove the four socket head capscrews (#13) securing the belt guard (#4) to the mount plate (#9) and remove the belt guard.
4. Slide the belt (#3) off the clutch (#7).
5. Remove the two flange screws (#24) securing the bellows retainer (#13), and remove the retainer.
6. Push the lip of the bellows (#3) through the hole in the engine deck.
7. Disconnect the hydraulic line (#20) from the control head in the handle assembly. Keep the end of the hydraulic line and control head fitting free of dirt and debris by using tape. Remove tie strap holding hydraulic hose & throttle cable together. **Be careful to use a drain pan to catch the hydraulic oil.**
8. Use the main lift hook on the roll cage (#5) to separate the engine deck from the base plate. **Be careful to guide the hydraulic line through the handle assembly and engine deck as the subassemblies are separated to prevent damage to components and personal injury.** If further disassembly of the engine deck is required proceed to step 9. If base plate service is required refer to **Base plate Disassembly Procedure** section of this manual.
9. Disconnect the throttle cable (#21) from the engine.
10. Remove the handle assembly by removing the four flange screws (#35) securing the shock mount (#19) to the engine deck.
11. Remove the four hex head capscrews (#27) securing the roll cage to the engine deck and remove the roll cage.
12. (Refer to Gasoline Engine Assembly, page 30) Remove the four hex head capscrews (#12) securing the engine to the engine deck and remove the engine.

Exciter Oil Change Procedure

Refer to Figure 1.

1. Clean all dirt and debris from base plate before disassembly to prevent contamination of exciter oil.
2. If installed, remove the two 5/8-11 socket head capscrews (#1) and bushings (#4) securing the base plate extensions (#3) to the base plate (#5) from the recoil/oil drain side of the base plate.
3. Tilt the plate toward a drain pan to aid in the removal of all used oil and particles.
4. Remove the socket head pipe plug (#2) from the base plate and drain the oil. **Examine the oil for metal chips as a precaution to future troubles.**
5. Tip the plate opposite the drain hole, and fill the base plate through the pipe plug opening with exciter oil to level specified in the **Fluid Levels** section of this manual. Use only MBW Ground Pounder Exciter Oil.
6. Reinstall the socket head pipe plug (#2) using sealant (LOCTITE #565).
7. If equipped, reinstall the bushings and base plate extension using antisieze lubricant (LOCTITE #767).

FIGURE 1



Lower Hydraulic Seal Replacement

Refer to Base Plate Assembly, page 26 for disassembly.

Note: The seals (#26), guide ring (#9), and gaskets (#30 and #32) should be replaced as a set. MBW recommends purchasing rebuild kit #17347 for ease of repairs (Seals are pre-assembled to the spool).

1. Position the handle in locked position and set the lock pin.

Refer to Main Assembly, page 22 for side cover removal.

2. Remove the six flange screws (#23) securing the side cover (#14) to the recoil/oil drain side of the base plate. Loosen hex head bolts (#29) on the oil drain side only. Lift the engine deck up to allow the side cover to be removed.

Refer to figure 2, page 12 for steps 3 & 4

3. Remove the socket head pipe plug (#7) from control head housing.
4. Remove the hydraulic line (#4) from the 90 degree fitting on the hydraulic housing. **Be careful to use a drain pan to catch the hydraulic oil.**

Refer to Base Plate Assembly, page 26

5. Remove the four flange screws (#41) securing the hydraulic housing (#31) and cylinder mount plate (#34) to the input shaft cover (#18) and remove the hydraulic housing.
6. Remove the shift spool (#29) from the shift shaft (#28) by sliding the shift spool out of the base plate and holding it secure while un-threading the shift spool. **NOTE: This connection is left hand thread.**
7. If you purchased the **rebuild kit (MBW Part Number 17347)** go to step #12.
8. Remove the seal guide ring (#9) from the shift spool.
9. Remove the damaged or worn seals (#26) from the shift spool (#29). **Note the orientation of the sealing lips of the seals to be replaced. Be careful not to scratch the inner diameter sealing surface of the shift spool when removing the seals.**
10. Remove the four flanged capscrews (#39), the cylinder cover (#33) and the cylinder gasket (#32). **Be sure to remove all of the gasket pieces from the hydraulic housing to provide a good seal surface for the new gasket.**
11. Remove the bleeder screw (#27) from its port on the hydraulic housing (#31). Thoroughly clean and inspect the bleeder screw for damage. Replace if needed.
12. Clean and inspect the shift spool (#29) and the hydraulic housing (#31).
13. Reinstall the bleeder screw(#27) into its port in the hydraulic housing (#31).
14. Install the new cylinder gasket (#32), the cylinder cover (#33) and the four flanged capscrews (#39).
15. Remove all mount gasket material from the input shaft cover (#18). **Be careful to keep debris and gasket pieces from entering the exciter assembly when cleaning the cover.**
16. If you purchased the **rebuild kit (MBW Part Number 17347)** go to step #20.
17. Assemble the new seals (#26) to the shift spool (#29). **Note the orientation of the seal lips. Hint: use hydraulic oil to lubricate the seal inner diameter before pressing onto the spool. Beware the slot cut on the shift spool it may be sharp. Press the seal on "WITH" the slot and <u>NOT</u> "ACROSS" the slot.**
18. Assemble the new guide ring (#9) to the shift spool (#29).
19. Thread the shift spool (#29) onto the shift shaft (#28). **Note the left hand thread.**
20. Install a new mount gasket (#30) on the hydraulic housing (#31).
21. Guide the hydraulic housing over the shift spool seals and guide ring and secure the cylinder mount plate (#34) to the input shaft cover (#18) using the four flange screws (#41) removed in step 5 using LOCTITE #243 on the screw threads. **Note: Tighten the screws in a criss-cross pattern, tighten evenly to prevent cocking the cylinder mount plate.**

Refer to figure 2 (page 12)

22. Clean and reattach the hydraulic line (#4) to the 90 degree fitting on the hydraulic housing. **Be sure the hydraulic line does not bind in the grommet. Loosen and rotate the hydraulic fitting and rotate it as required.**
23. Follow the steps for Bleeding And Adjustment Of Hydraulic Controls section of this manual.
24. Reinstall the side cover removed in step 2 using LOCTITE #243 on the screw threads.
25. Lower engine deck to level position and tighten hex head bolts (#29).

Refer to Base Plate Assembly, page 26

Bleeding And Adjustment of Hydraulic Controls

Refer to Figure 2, page 12

1. Remove the six flange screws (#2) securing the side cover (#3) to the recoil/oil drain side of the base plate. Loosen hex head bolts (#1) on the oil drain side only. Lift the engine deck up to allow the hydraulic guard to be removed.
2. Position the handle in the operating position as shown.
3. Check the hydraulic line (#4) for loose fittings and tighten as needed.
4. Remove the pipe plug (#7) from the control head.
5. Loosen the bleeder screw (#5) located at the hydraulic control housing of the exciter.
6. Fill the control head with hydraulic fluid as shown in Maintenance section of this manual.
7. Place a drip pan or shop rag below the bleeder to catch any excess oil.
8. Slowly operate the control handle (#6) from the forward to the reverse position while watching the bleeder screw hole for air bubbles. If no air bubbles are seen, hold the control handle in the reverse position and tighten the bleeder. If air bubbles are still

present at the end of the stroke, refill the control head with hydraulic oil and repeat this procedure.

9. After the air bubbles have been removed, tighten the bleeder screw (#5) and adjust the hydraulic oil level in the control head by pushing the shift handle to the forward position and then pulling it into the reverse position until it stops. Repeat this procedure two times.
10. With the shift lever in the forward position fill control head with hydraulic oil as shown in step 6.
11. Reinstall the pipe plug (#7).
12. Reinstall the side cover removed in step 1 using LOCTITE #243 on the screw threads.
13. Lower engine deck to level position and tighten hex head bolts (#1).

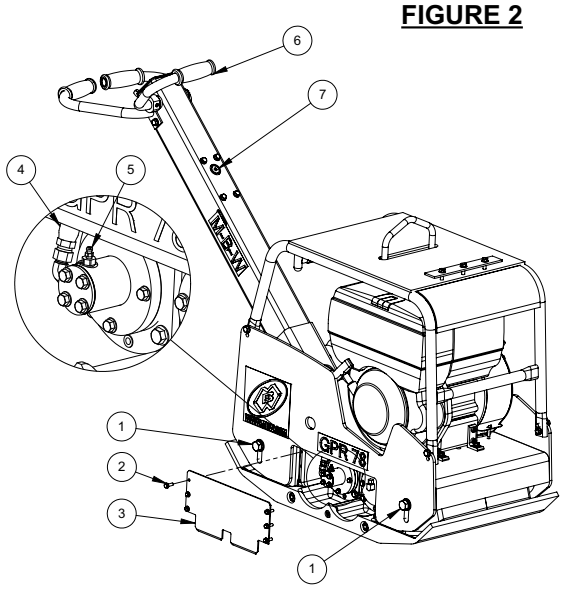
Base plate Disassembly Procedure

Reference the Main Disassembly Procedure (diesel) or (gasoline) engine, listed earlier in this section, to separate the engine deck from the base plate.

Refer to Main Assembly, page 22.

1. If installed, remove the four socked head capscrews (#31), extension plates (#6) and bushings (#10) from the sides of base plate (#4).
2. Remove the twelve hex head flange screws (#23) securing the side covers (#14) to the base plate.
3. Remove the four hex head flange screws (#23) securing the bellows mounts (#16) to the base plate and remove the bellows mounts and bellows (#3).
4. Disconnect the hydraulic line (#20) from the hydraulic fitting.
5. Remove the four hex head flange screws (#23) securing the hydraulic guard (#15) to the base plate and remove the hydraulic guard and hydraulic line from the base plate.

FIGURE 2



Refer to Base Plate Assembly, page 26.

6. Remove the flat torx head screw (#36) and washer (#37) securing the pulley (#35) to the input shaft (#21) and remove the pulley.
7. Remove the hex head flange screws (#43) securing the base plate cover (#25) to the base plate (#14) and remove the base plate cover.
8. Remove the oil drain plug (#46) and completely drain the exciter oil into a drain pan. **Examine the oil for metal chips as a precaution to future troubles.**
9. **Note the position of the gear timing marks.**
10. Remove the socket head capscrews (#45) securing the exciter weights (#24) to the shafts and remove the exciter weights.
11. Place a shop rag under the hydraulic housing (#31) to catch the oil and remove the four flange screws (#41) securing the cylinder mount plate (#34) to the input shaft cover and remove the hydraulic housing (#31) from the base plate.
12. Remove the four hex head flange screws (#39) securing the cylinder cover (#33) to the hydraulic housing (#31) and remove the cylinder cover and gasket (#32).
13. Remove the shift spool (#29) from the shift shaft (#28) by sliding the shift spool out of the base plate and holding it secure while unthreading the shift spool. **NOTE: This connection is left hand thread.**
14. Remove the plastic plugs (#1) from the threaded holes in the shaft covers (#16, #17, & #18). This can be done using a #2 phillips screwdriver lightly tapped into the center of the plug and unthreading it as a screw.
15. Clean all dirt from the threaded holes in the shaft covers which were not plugged and “chase” the threads with a 5/16-18 UNC thread tap.
16. Remove the covers from the idler shaft (#23) ends of the base plate by removing the flange screws (#44) and using two 5/16-18 x 2” long screws to press off the covers by installing them into the threaded holes cleaned in the previous steps. **Turn both screws evenly to prevent binding of the cover in the bore.**
17. **Note: Make sure the bearings and their inner races are kept as a matched set.**
18. Remove the idler shaft (#23) and idler gear (#20) from the base plate.
19. Press the inner bearing races from the ends of the idler shaft (#23).
20. Press the idler gear (#20) off the idler shaft (#23) and remove the key. (#11).
21. Repeat steps 16 and 17 for the input shaft covers.
22. Remove the input shaft (#21) as an assembly from the base plate.

23. Slide the input gear (#19) to one end of the input shaft and remove the helix pin (#5) from the input shaft and slide out the helix pin carrier (#22) as a subassembly.
24. Press the inner bearing races from the ends of the input shaft (#21).
25. Slide the input gear (#19) off of the input shaft (#21).
26. Remove the roller bearings (#13) from the shaft covers (#16, #17 & #18) by removing two 5/16" flange head bolts (#44) from the covers and use a 1/4" x 2" long pin punch to "tap" the bearings out of the covers. **Alternate between the access holes evenly to prevent binding of the bearings in the covers.**
27. **Note: performance of the following steps will require replacement of the ball bearings (#6). M-B-W recommends replacement of these bearings as a set at every complete disassembly or rebuild.**
28. Remove the internal retaining ring (#7) from the helix pin carrier (#22) and remove the shift shaft (#28) and bearings (#6) as a subassembly from the carrier.
29. Remove the e-clip retaining ring (#8) securing the bearings to the shift shaft.
30. Secure the bearings in a vice and press out the shift shaft (#28). **Note the position of the spacer washer (#10).**

Handle Disassembly Procedure

Refer to Main Assembly, page 22.

1. Disconnect the hydraulic line (#20) from the fitting in control head (#9). **Use a drain pan to catch the hydraulic oil.**
2. Disconnect the throttle cable (#21) from the engine.

Refer to Handle Assembly, page 24

3. Remove the two flat head flange screws (#21), lock washers (#23) and hex nuts (#22) securing the throttle lever (#7) to the handle and remove the throttle lever and throttle cable as a subassembly from the handle.

Refer to Main Assembly, page 22 for steps 4 & 5

4. Remove the four flange wiz lock screws (#35) securing the shock mount to the engine deck (#22).
5. Remove the handle assembly from the main assembly.

Refer to Handle Assembly, page 24

6. Remove the four hex head flange screws (#31) securing the handle mounts (#4) to the handle (#8) from inside the tube.
7. Remove the two jam nuts (#32) securing the threaded rod (#2) to the handle and remove the handle bumper shock mount (#3) and threaded rod.
8. Drive the spiral pin (#29) from the control handle (#17) and separate the control handles from the control shaft (#20).
9. Remove the four hex head flange screws (#30) securing the handle bars (#11 and #12) to the handle and remove the handlebars from the handle.
10. Remove two self tapping screws (#1) from handle tube (#8) and remove tube cap (#13).
11. Remove retaining rings (#6) from control shaft (#20) and two flange lock screws (#24) from shift bracket (#10) and slide control shaft (#20) out of handle tube.
12. Remove four flange lock screws (#27) from control head (#9) and slide control head out end of handle tube (#8).
13. Remove bearings (#14) from handle tube (#8).
14. Remove shoulder bolts (#18), washer (#26) and locknuts (#25) from shift linkage (#16).

Control Head Disassembly Procedure

Refer to Control Head Assembly, page 28.

1. Remove the hydraulic fitting (#1), adapter fitting (#14) and O-ring (#3) from the control head housing (#7).
2. Push piston shaft (#12) out of control head by lightly tapping the exposed end, being careful not to damage the shaft.

Note the orientation of hydraulic seal (#5) lip direction.

3. Remove seal (#5) and guide bearing (#10) from shaft (#12).
4. Remove seal cap (#13) and washer seal (#2) from control head (#7).

Note: When removing seals be careful not to scratch or damage seal mounting surfaces.

5. Remove hydraulic seal (#9), guide ring (#11) and wiper seal (#8) from seal cap (#13).
6. Remove socket pipe plugs (#15 & 16), and hydraulic fitting (#6) from control head (#7)**.**
7. If Required use a 1/4" pin punch to drive the slide bushing (#4) out of the control head (#7).
8. Clean the control head (#7) to remove any dirt or debris, making sure all ports & passages are open**.**

Base plate Assembly Procedure

Refer to Base Plate Assembly, page 26.

1. Clean all base plate components.
2. **Note: Make sure the bearings and their inner races are kept as a matched set.**
3. Inspect all bearings, shafts, helix pin carrier and gears for wear, debris and discoloration from heat. Replace as needed. **Replace the roller bearings**

and the inner races on each shaft as a set (both bearings on the shaft) as needed. Replace the helix carrier ball bearings as a set at each complete disassembly or rebuild. Replace all seals and gaskets removed at each disassembly or inspection.

4. Install the input shaft cover seal (#4) into cover (#18).
5. Press the roller bearings (#13) into all four of the covers (#16, #17 & #18). **Note: Make sure the bearings and their inner races are kept as a matched set.**
6. Install the hex head flange screws (#40) and washers (#42) into the shaft bearing covers using LOCTITE #243 thread locker sealant.
7. Install the plastic plugs (#1) in the threaded holes used to press the covers out of the base plate.
8. Install the key (#11) into the idler shaft (#23).
9. Align the idler gear (#20) with the key (#11) and idler shaft (#23) and press the idler gear onto the idler shaft using exciter oil as a lubricant. **Reference the figure 5 for the idler gear and shaft orientation.**
10. Press the bearing inner races onto the idler shaft/ gear assembly. **The flanged end of the inner race goes toward the shoulder on the shaft.**
11. Place the idler shaft and gear assembly into the base plate housing in the forward location. **Note: The housing is not symmetric. The input/pulley side of the housing has a pocket machined for the belt bellows. This pocket is to be oriented toward the front left side of the machine. The end of the idler shaft with the hole goes toward the front right side of the machine with the breather/cover (#16).**
12. Install the idler shaft covers (#17) on the pulley side, and (#16 on the hydraulic side). Secure each cover with four hex head flange screws (#44) using LOCTITE #243 on the bolt threads and torque the flange screws to 13 ft.-lbs. **See the figure #3 for LOCTITE #515 gasket maker application. Check idler shaft for minimum of .020" end play after covers are installed and the bolts are torqued**.
13. Install the 90 degree fitting (#2) containing the roll pin (#38) into the bearing cover (#16) using LOCTITE #565 sealant on the threads. **Make sure the port for the breather faces the top of the base plate housing.**
14. Install the breather (#3) into the 90 degree fitting (#2).
15. Install the exciter weights (#24) on the idler shaft (#23) and secure with four socket head cap screws (#45) using LOCTITE #243 thread locker sealant and torque the cap screws to 32 ft.-lbs.
16. Press one bearing inner race onto one end of the input shaft (#21). **Note: Make sure the bearings and their inner races are kept as a matched set. The flange on the inner race goes toward the shoulder of the shaft.**
17. Install the input gear (#19) onto the input shaft (#21) and slide to the end with the bearing inner race.
18. Press the other bearing inner race onto the input shaft (#21).
19. Install the input shaft subassembly into the base plate with the keyed end toward the left side (pulley side) of the base plate.
20. Install the pulley side shaft cover (#18), containing the shaft seal (#4) over the input shaft on the pulley side of the base plate. **See the figure #3 for LOCTITE #515 gasket maker application. Lubricate the input shaft seal and bearing with exciter oil before inserting the input shaft through**

FIGURE 3

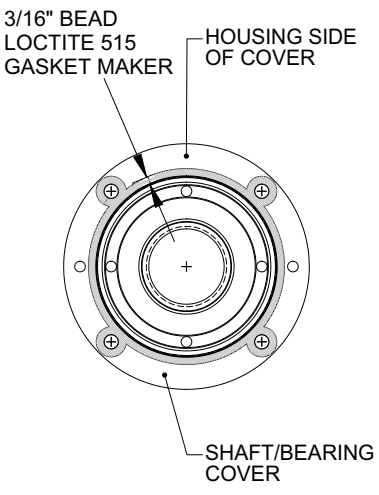
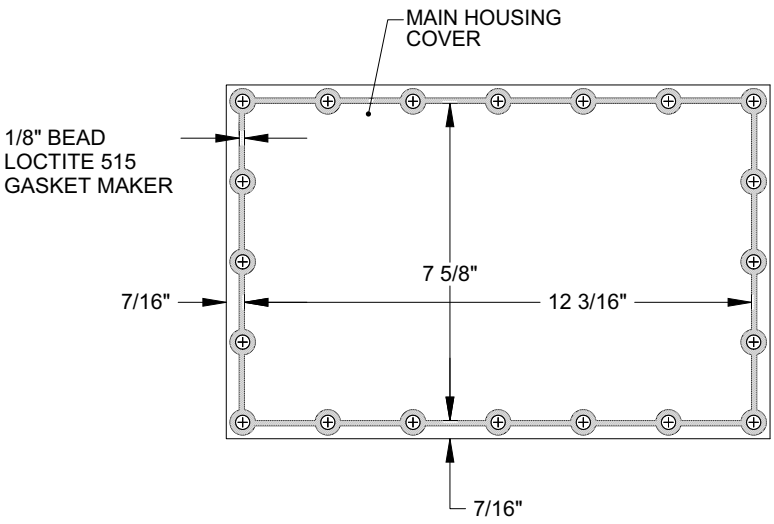


FIGURE 4



BASE PLATE COVER SEALANT APPLICATION

the oil seal in the cover to prevent tearing the seal.

21. Secure the input shaft cover with the four flange head crews (#44) using LOCTITE #243 thread locker sealant on the bolt threads and torque the capscrews to 13 ft.-lbs.
22. Install the other input shaft cover (#18) and secure with the four flange head screws (#44) using LOCTITE #243 thread locker sealant and torque the screws to 13 ft.-lbs. **See the figure #3 for LOCTITE #515 gasket maker application. Check input shaft for minimum of .020" end play after covers are installed and the bolts are torqued.**
23. Install one exciter weight (#24) to the input shaft on the hydraulic housing side of the base plate with two socket head cap screws (#45) using LOCTITE #243 thread locker sealant and torque the cap screws to 32 ft.-lbs. **Be careful to use a small amount of thread locker to avoid dripping it into the helix pin carrier bearings at installation.**
24. Slide the input gear (#19) toward the pulley side of the input shaft (#21). The gears should not be meshing at this time.
25. Install the ball bearings (#6) and the spacer washer (#10) onto the shift shaft (#28) and secure with the e-clip (#8).
26. Press the shift shaft and ball bearing assembly into the helix pin carrier (#22) and secure with the internal retaining ring (#7).
27. Lubricate the helix pin carrier/shift shaft assembly with exciter oil and slide into the input shaft and install the dowel pin (#5).

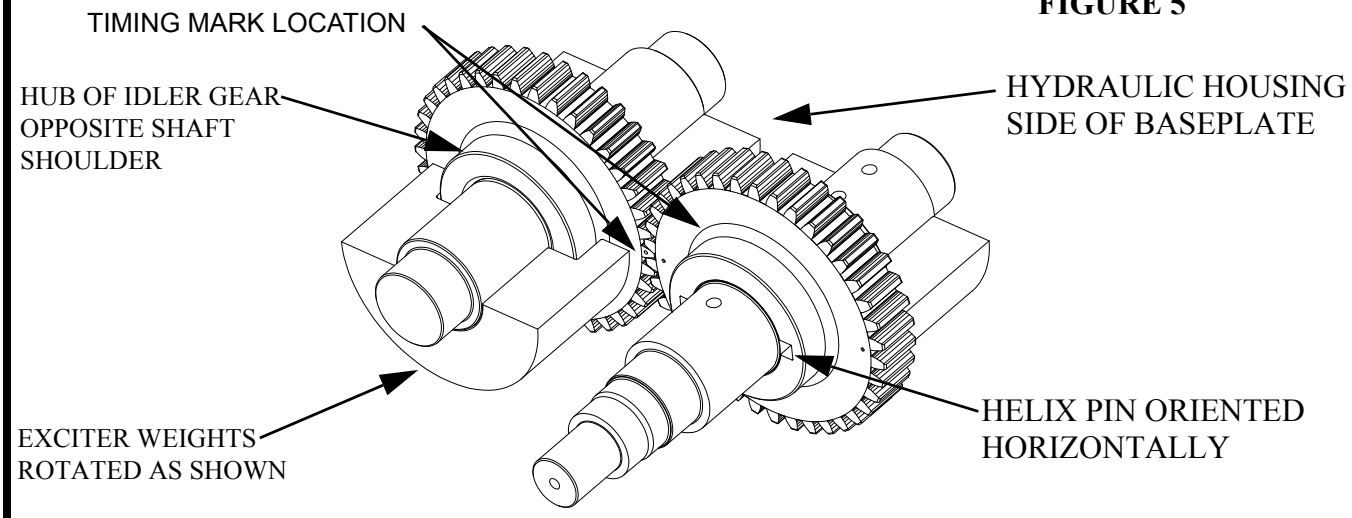
Note: Helix pin carrier MUST slide freely in input shaft.

28. Slide the helix pin/carrier to the middle of the helix and orient the dowel pin parallel with the bottom of the base plate housing (#14).
29. Align the timing marks on both gears and slide the input gear over the helix pin/carrier and into mesh with the gear on the idler shaft. **See the figure #5 for setting the gear timing.**
30. Install the other exciter weight (#24) to the input shaft (#21) with two socket head cap screws (#45) using LOCTITE #243 thread locker sealant on the threads and torque the cap screws to 32 ft.-lbs. **Be careful to use a small amount of thread locker to avoid dripping it into the helix pin carrier bearings at installation.**
31. Check the gear timing to assure free motion of the shift shaft/helix pin carrier within the helix of the input shaft for the full range of motion from one end of the helix to the other. Weights on both shafts to be down when timed properly.

Note: The seals (#26), guide ring (#9), and gaskets (#30 and #32) should be replaced as a set. MBW recommends purchasing rebuild kit #17347 for ease of repairs (Seals are pre-assembled to the spool).

32. If rebuild kit #17347 was purchased, skip to step #34.
33. Assemble the new seals (#26) to the shift spool (#29). **Note the orientation of the seal lips. Hint: use hydraulic oil to lubricate the seal inner diameter before pressing onto the spool. Beware the slot cut on the shift spool. It may be sharp. Press the seal on "WITH" the slot and <u>NOT</u> "ACROSS" the slot.**
34. Thread the shift spool with seals onto the shift shaft (#28). **Note the left had thread.**
35. Assemble the new guide ring (#9) to the shift spool.

FIGURE 5



BASEPLATE GEAR TIMING

36. Install a new mount gasket (#30) onto the hydraulic housing (#31).
37. Lubricate the inside of the hydraulic housing (#31) and the seal lips with hydraulic oil. **See Maintenance section for hydraulic fluid type.**
38. Install the hydraulic housing over the hydraulic seals and guide ring. **Be careful not to damage the guide ring and hydraulic seals during installation.**
39. Secure the mount plate (#34) over the hydraulic housing (#31) to the input shaft cover (#18) with the four flanged cap screws (#41) using LOCTITE #243 thread locker sealant on the threads and torque the cap screws evenly in stages to 13 ft.-lbs. **Make sure the bleeder screw port (#27) is in the vertical position.**
40. Install the gasket (#32) and cover (#33) to the hydraulic housing (#31) with four hex head flange screws (#39) using LOCTITE #243 thread locker sealant on the threads and torque the cap screws to 76 in-lbs.
41. Install the 90 degree fitting (#15) into the port on the hydraulic housing (#31).
42. Install the bleeder screw (#27) loosely into the port fitting of the hydraulic housing.
43. Install the socket head pipe plug (#46) into the oil drain port using LOCTITE #565 pipe sealant.
44. Pour in the exciter oil. **Use only MBW Ground Pounder Exciter Oil. The amount of exciter oil required is shown in the FLUID LEVELS section of this manual.**
45. Install the base plate cover (#25) using LOCTITE #515 gasket maker on the lip of the mounting surface and secure with twenty hex head flange screws (#43) using LOCTITE #243 on the threads. **See the figure #4 for LOCTITE #515 gasket maker application.**
46. Install the key (#12) into the input shaft (#21).
47. Install the pulley (#35) with the longer hub shoulder toward the base plate housing.
48. Install the pulley mount washer (#37) and secure it to the input shaft with the flat torx HD screw (#36) using LOCTITE #243 thread locker sealant on the threads.

Refer to engine pages (Gasoline or Diesel)

49. Install the v-belt (#3) to the pulley of the base plate assembly.

Refer to Main Assembly, page 22

50. Install the side cover (#14) on the pulley side of the base plate housing and secure with six hex head flange screws (#23) using LOCTITE #243 thread locker sealant.
51. Install the bellows (#3) into the bellows mount plate (#16) and secure it to the base plate with four hex head flange screws (#23).
52. Connect the hydraulic line (#20) to the 90 degree fitting on the hydraulic housing.
53. Install the grommet (#2) into the hydraulic guard (#15).
54. Guide the hydraulic line(#20) through the grommet (#2) in the hydraulic guard (#15) and secure the guard to the hydraulic side of the base plate with the four hex head flange screws (#23). **Set the side cover (#14) off to the side until bleeding and final assembly is done. The exciter is now ready for final assembly.**
55. If required, install the bushings (#10), extension plates (#6), and socket head cap screws (#31) to the sides of base plate housing using LOCTITE #767 antisieze compound on the bushings and bolt threads.

Control Head Assembly Procedure

Refer to Control Head Assembly, page 28.

1. Clean and dry all parts to be assembled.
2. If required press the slide bushing (#4) into the control housing (#7).
3. Press the hydraulic seal (#5) onto the piston shaft (#12). **Be careful to orient the seal lip to face away from the guide ring groove. Tip: Use approved hydraulic oil to lubricate the seal inside diameter to ease assembly. See Maintenance Section for type of hydraulic oil.**
4. Assembly the bearing guide ring (#10) to piston shaft (#12) groove behind the hydraulic seal (#5).

Note: Use hydraulic oil to lubricate guide ring & hydraulic seal before assembling into control housing.

5. Slide the piston shaft assembly (#12) into the control head housing (#7), being careful not to damage guide ring or hydraulic seal when entering control housing.
6. Install O-ring (#3) and hydraulic fitting (#1) to adapter nut (#14).
7. **Install adapter nut assembly (#14) into control head housing (#7).**

Note: Use hydraulic oil to lubricate guide ring & hydraulic seals before assembling into seal cap.

8. Assemble guide ring (#11), hydraulic seal (#9) and shaft wiper seal (#8) into seal cap (#13).
9. Install washer seal (#2) and seal cap assembly (#13) over piston shaft (#12) and into control head housing (#7).

10. Assemble socket pipe plugs (#15 & 16) into control head housing using LOCTITE #565 pipe sealant.
11. Install hydraulic fitting (#6) into control head housing.

Handle Assembly Procedure

Refer to Handle Assembly, page 24.

1. Install shift linkage (#16) to control head (#9) with shoulder bolt (#18), washer (#26) and lock nut (#25).
2. Assemble shift bracket (#10) to shift linkage (#16) with shoulder bolt (#18), washer (#26) and lock nut (#25)
3. Install the control head assembly (#9) into the handle tube (#8) with four flange lock screws (#27).
4. Install plain bearings (#14) into each side of handle tube (#8).
5. Install control shaft (#20) into handle tube (#8) and secure with retaining rings (#6).

Note: Control shaft can be install for either right or left hand operation.

6. Install control handle (#17) to control shaft (#20) and secure by driving spiral pin (#29) through handle hub & control shaft.
7. Assemble shift bracket (#10) to control shaft (#20) with flange lock screws (#24).
8. Install throttle lever (#7) to handle tube (#8) with flat head screw (#21), lock washers (#23) and hex nuts (#22).
9. Install handle bars (#11 & 12) to handle tube (#8) using flange lock screws (#30).
10. Install tube cap (#13) to handle tube (#8) with self tapping screws (#1).
11. Install bumper bracket (#15) to handle tube (#8) using flange lock screws (#28).
12. Assemble threaded rod (#2), hex nuts (#32) and handle bumper (#3) to bumper bracket (#15).
13. Assemble handle mounts (#4) to handle tube (#8) with flange lock screws (#31).

Final Assembly

Refer to Main Assembly, page 22.

1. Install the shock mounts (#19) to spindle mount (#12) with flat head socket screw (#36) onto the handle assembly (#18).
2. Route the hydraulic line (#20) through engine deck and up inside of the handle tube.
3. Secure the handle assembly (#18) to the engine deck with four hex head flange screws (#35).
4. Secure the hydraulic line (#20) to the hydraulic control head fitting.
5. Install roll cage assembly (#5) to engine deck (#22) using flange lock screws (#27) and flange lock nuts (#28)
6. Lower engine deck assembly (#22) onto base plate assembly (#4).
7. Push lip of bellow (#3) through hole in engine deck (#22) and secure with bellow retainer (#13) and flange lock screws (#24).
8. Install engine assembly to engine deck with four bolts, lock washers and washers (#13, #15 & #16) or (#12, #13 & #14) through the engine block into engine deck. (gasoline engine may also require shims #10 & #11).
9. Install throttle cable (#21) to engine.
10. Install tie wrap at bottom of handle to hold hydraulic hose & throttle cable together.
11. Install four bolts (#29) lock washers (#33) and washers (#34) through engine deck into shock mounts on bottom plate.
12. Refer to the **Belt Adjustment** section of this manual to complete assembly.
13. Bleed the hydraulics according to the **Bleeding and Adjustment of Hydraulic Controls** section of this Manual.
14. Assemble side covers (#14) to bottom plate (#4) using flange lock screws (#23).

Troubleshooting

SYMTOM	REPAIR
Engine does not start or stalls.	1. Fuel valve is closed, open valve (gasoline engine). 2. Engine switch is in “STOP” position, turn switch to “ON” position (gasoline engine). 3. Fouled spark plug, clean or replace spark plug (gasoline engine). 4. Dirty or pugged injection nozzle, clean or replace if damaged. 5. Defective or worn ignition switch, replace ignition switch.
Engine does not accelerate, is hard to start or runs erratically.	1. Improper or old fuel, remove all fuel from tank & engine and replace with the proper fresh fuel. 2. Fouled spark plug, clean or replace spark plug (gasoline engine). 3. Dirty or pugged fuel filter, replace with new fuel filter. 4. Dirty or pugged injection nozzle, clean or replace if damaged. 5. Dirty or clogged air cleaner, clean or replace.
Engine over heats or runs hot.	1. Cooling fins are dirty or plugged, remove debris and clean.
Engine runs at full speed but machine does not move.	1. Belt tension too loose, tighten belt per Belt Adjustment section of this Manual. 2. Worn belt, replace belt. 3. Clutch malfunction, replace clutch.
Slow or no forward travel speed.	1. Too much hydraulic fluid in control head, set fluid level per Bleeding and Adjustment of Hydraulic Controls section of this manual. 2. Improper adjustment of hydraulic control system, requires authorized MBW service repair. 3. Belt is slipping, tighten belt per Belt Adjustment section of this Manual. 4. Incorrect engine rpm., reset engine rpm per Specifications section of this manual. 5. Material build-up on bottom of plate, remove all debris from bottom of plate. 6. Mechanical failure, requires authorized MBW service repair.
Slow or no reverse travel speed.	1. Not enough hydraulic fluid in control head, set fluid level per Bleeding and Adjustment of Hydraulic Controls section of this manual. 2. Air in the hydraulic system, bleed system per Bleeding and Adjustment of Hydraulic Controls section of this manual. 3. Improper adjustment of hydraulic control system, requires authorized MBW service repair. 4. Incorrect engine rpm., reset engine rpm per Specifications section of this manual. 5. Material build-up on bottom of plate, remove all debris from bottom of plate. 6. Mechanical failure, requires authorized MBW service repair.
Loss of hydraulic oil.	1. Leaking hydraulic connections, tighten connections. 2. Leaking hydraulic line, replace hydraulic hose. 3. Worn or damaged piston seals, requires authorized MBW service repair.

Parts Replacement Cycles and Tolerances

Bearings	Replace anytime a bearing is rough, binding, discolored or removed from housing or shaft.
Clutch	Replace clutch if it does not disengage below 1800 rpm.
Engine Components	Refer to your engine manufacturer's Owner's Manual.
Hardware	Replace any worn or damaged hardware as needed. Replacement hardware should be grade 5 and zinc plated unless otherwise specified.
Safety Decals	Replace if they become damaged or illegible.
Seals & Gaskets	Replace if a leak is detected and at every overhaul or teardown.
V-Belts	Replace if cracked, torn, or stretched to the point the belt won't tension properly.

Replacement Parts

The warranty is stated in this book on page 34. Failure to return the Warranty Registration Card renders the warranty null and void.

MBW has established a network of reputable distributors/ dealers with trained mechanics and full facilities for maintenance and rebuilding, and to carry an adequate parts stock in all areas of the country. Their sales engineers are available for professional consultation. If you cannot locate an MBW distributor in your area, contact MBW or one of our Sales Branches listed below.

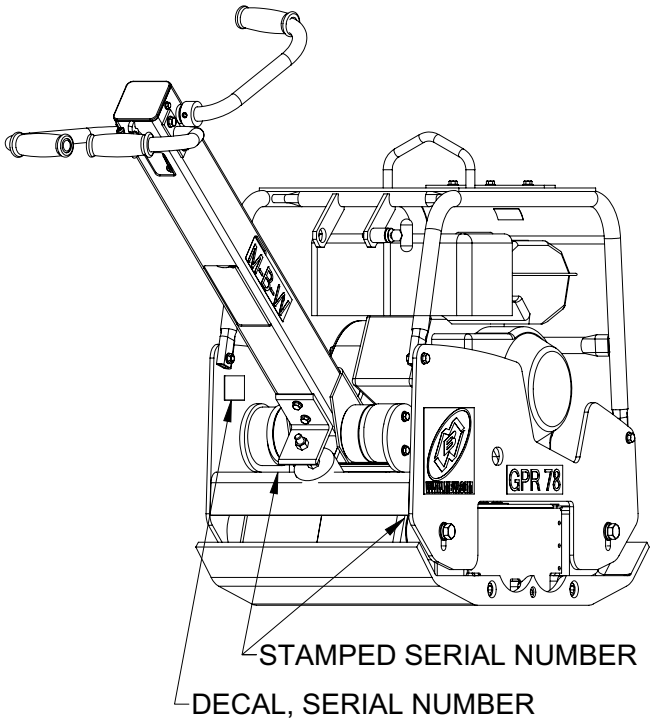
When ordering replacement parts, be sure to have the following information available:

- Model and Serial Number of machine when ordering MBW parts
- Model and Serial Number of engine when ordering engine parts
- Part Number, Description, and Quantity
- Company Name, Address, Zip Code, and Purchase Order Number
- Preferred method of shipping

REMEMBER - You own the best! If repairs are needed, use only MBW parts purchased from authorized MBW distributors.

Write Model Number here

Write Serial Number here



The unit's serial number can be found in the following locations:

- The model/serial number decal is located on the engine deck side plate behind the engine as shown above.
- The serial number is stamped on the bottom plate housing (top edge near right rear shockmount) and the back end of the engine deck as shown above

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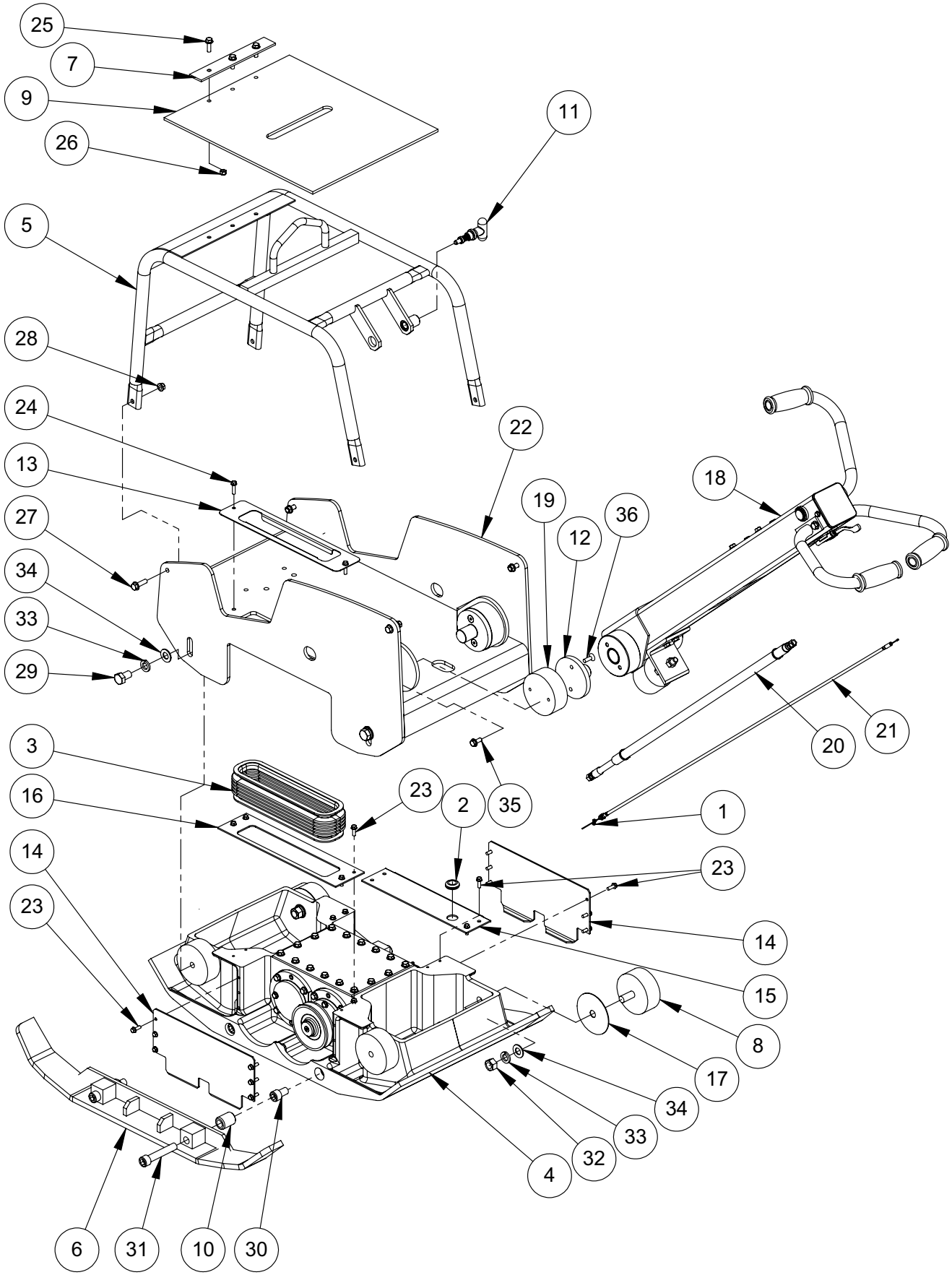
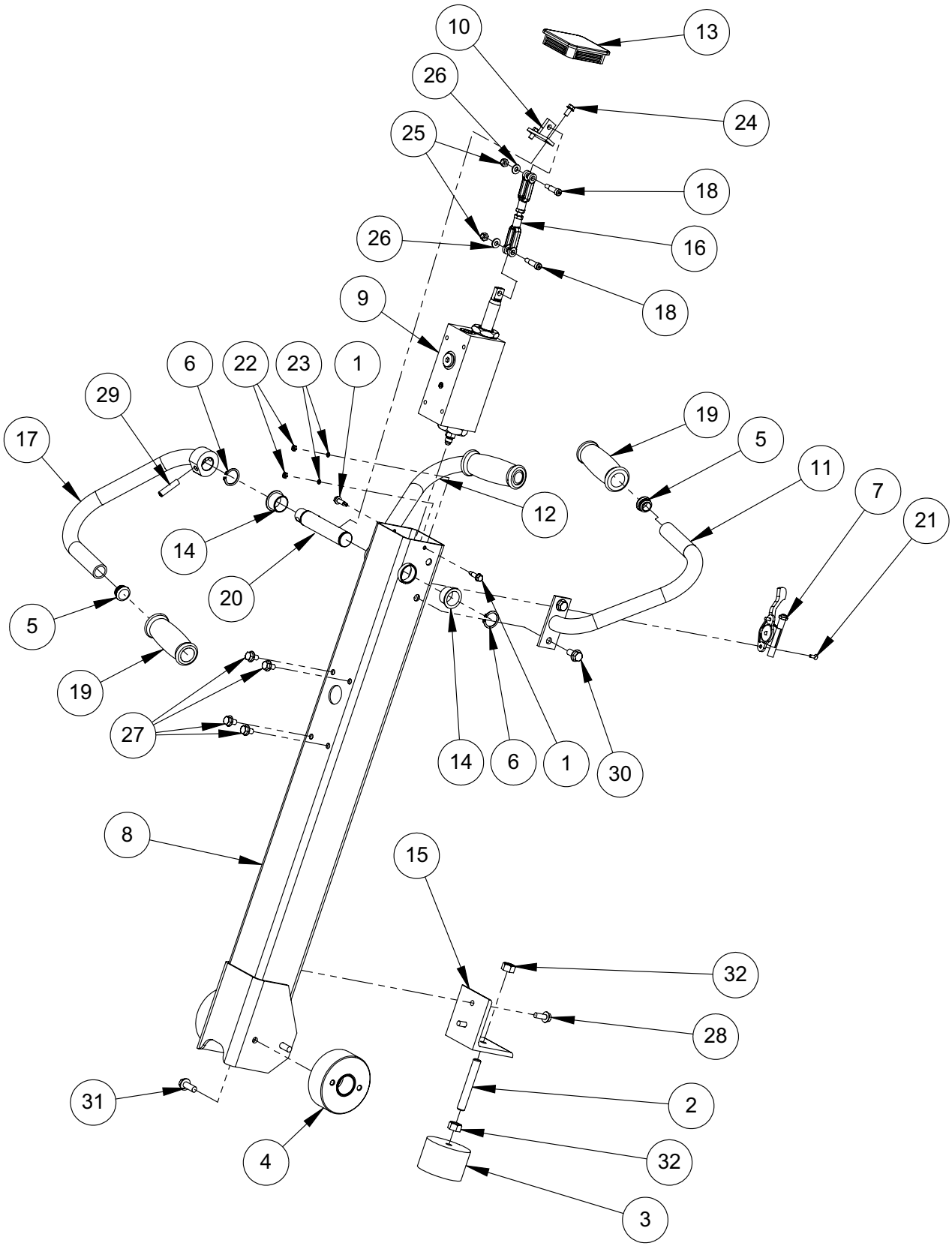


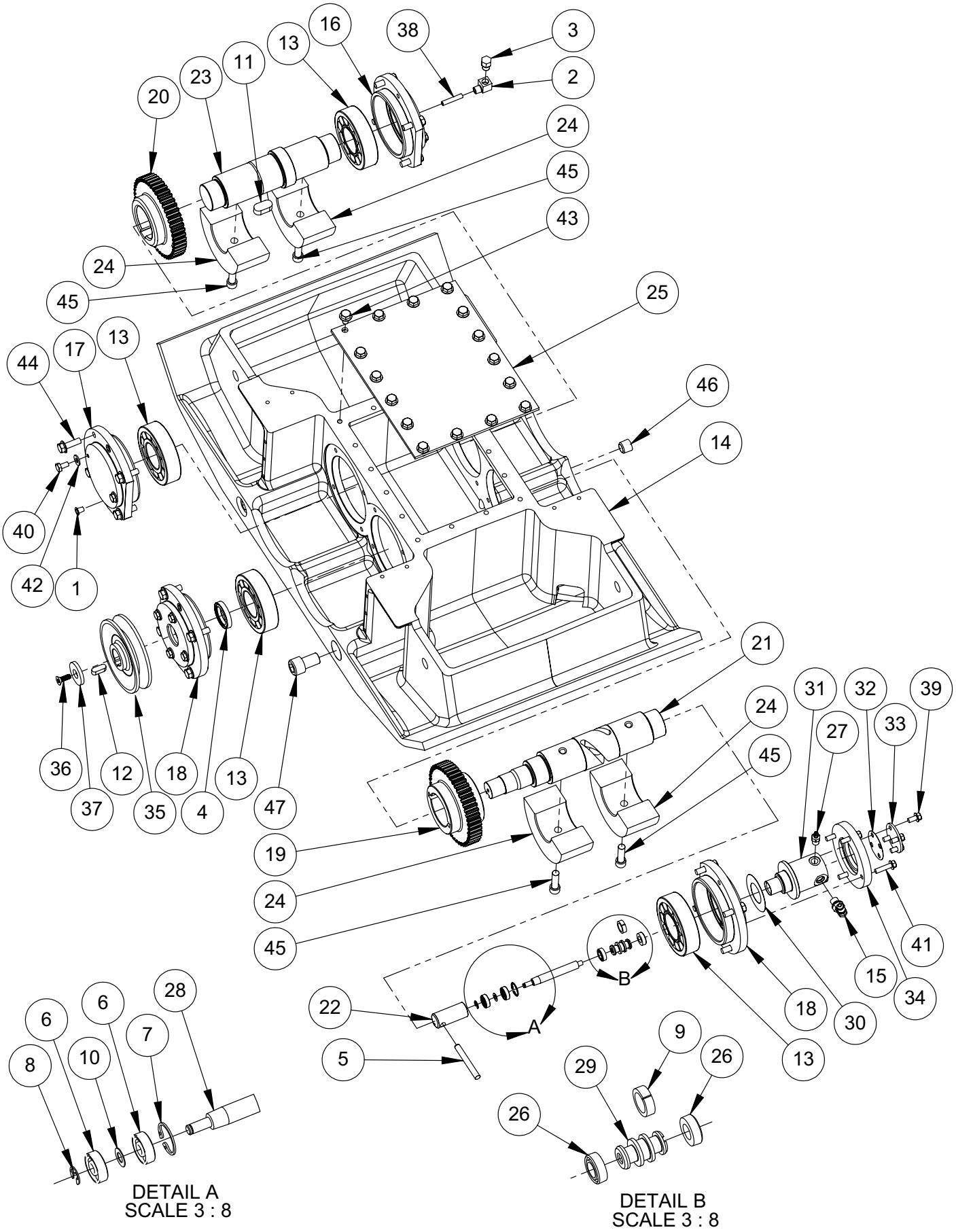
Main Assembly

ITEM	PART NO.	DESCRIPTION	QTY
1.	05477	SWIVEL, THROTTLE CABLE	1
2.	10088	GROMMET, 11/16” I.D.	1
3.	16442	BELLOWS	1
4.	16496	BASE PLATE	1
5.	16525	ROLL CAGE	1
6.	16552	PLATE EXTENSION, 3” WIDE	2
7.	16654	MOUNT, PLATE	1
8.	16991	SHOCK MOUNT	4
9.	17021	RUBBER MAT	1
10.	17225	BUSHING, PLATE EXTENSION MOUNT	4
11.	17340	POP-PIN, HANDLE	1
12.	17402	MOUNT, SPINDLE, PLATED	2
13.	17462	BELLOWS RETAINER	1
14.	17506	SIDE GUARD	2
15.	17507	GUARD, HYDRAULIC, TOP	1
16.	17508	BELLOW MOUNT	1
17.	17997	SHIM, SHOCK MOUNT (MAY NOT BE REQUIRED)	2
18.	19445	HANDLE, COMPLETE	1
19.	19533	SHOCKMOUNT	2
20.	19557	HYDRAULIC HOSE	1
21.	19591	THROTTLE CABLE ASSEMBLY	1
22.	20331	ENGINE DECK	1
23.	F042006FWS	FLANGE LOCK SCREW, 1/4-20 x 3/4, PLATED	20
24.	F042008FWS	FLANGE LOCK SCREW, 1/4-20 x 1.0, PLATED	2
25.	F051808FWS	FLANGE LOCK SCREW, 5/16-18 x 1.0, PLATED	3
26.	F0518ELN	NYLOC LOCK NUT, 5/16-18, PLATED	3
27.	F061610FWS	FLANGE LOCK SCREW, 3/8-16 x 1-1/4, PLATED	4
28.	F0616FN	FLANGE LOCK NUT, 3/8-16	4
29.	F101108HCS	HEX HEAD CAP SCREW, 5/8-11 x 1.0, PLATED	4
30.	F101108SCS	SOCKET HEAD SCREW, 5/8-11 x 1.0, PLATED	4
31.	F101128SCS	SOCKET HEAD SCREW, 5/8-11 x 3-1/2, PLATED	4
32.	F1011HN	HEX NUT, 5/8-11, PLATED	4
33.	F10LW	LOCKWASHER, 5/8, PLATED	8
34.	F10PW	PLAIN WASHER, 5/8, PLATED	8
35.	M08C020FWS	FLANGE WIZ LOCK SCREW, M8 X 20	4
36.	M08C025FSS	FLAT HEAD SOCKET SCREW, M8 X 25	4
		KITS:	
	17346	KIT, PLATE EXTENSIONS, (includes items 6, 10 & 31)	



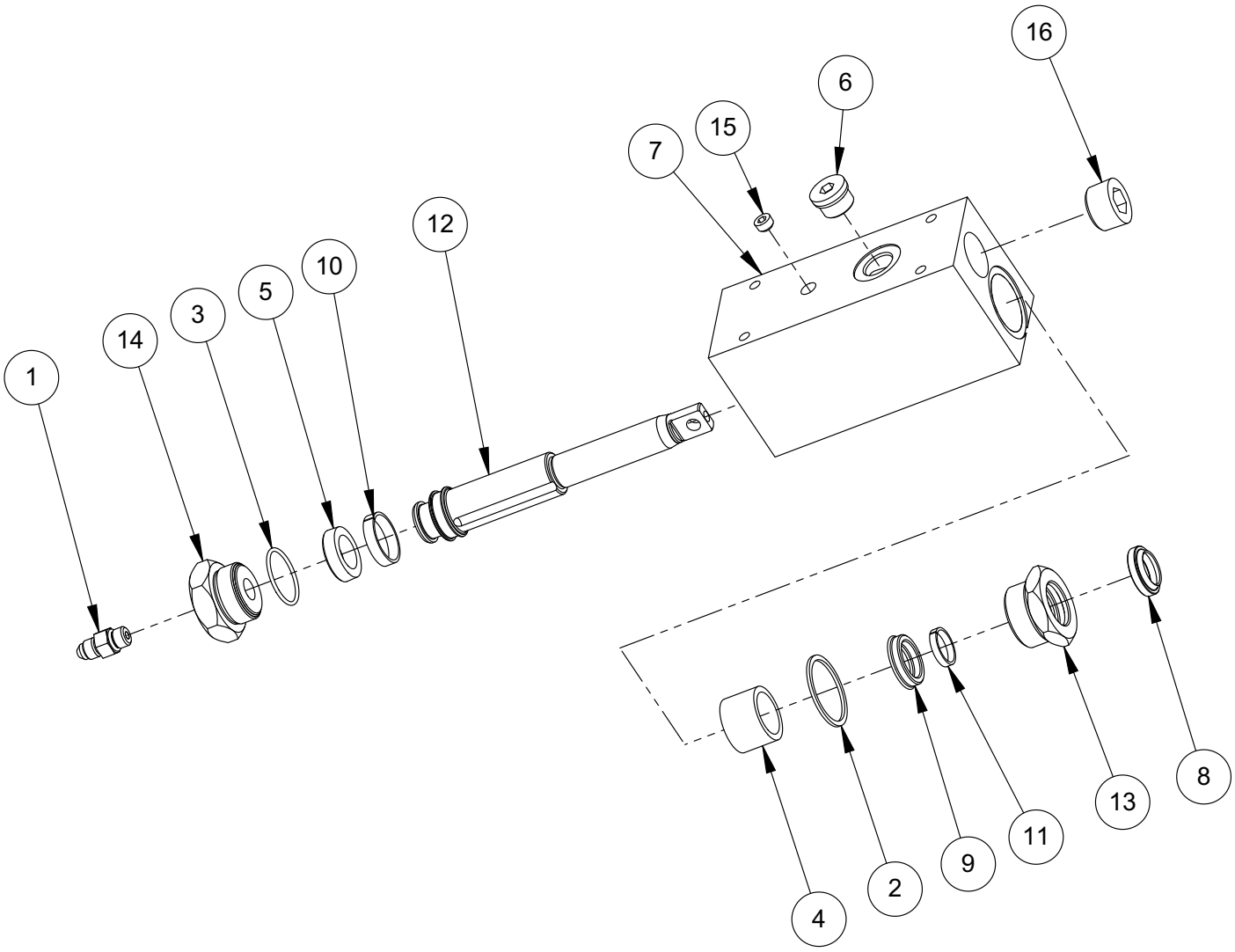
Handle Assembly

ITEM	PART NO.	DESCRIPTION	QTY
1.	11162	SCREW, 1/4 x 1.00, TEKS	2
2.	16410	THREADED ROD, 1/2-13 x 3.00, PLATED	1
3.	16493	HANDLE BUMPER	1
4.	16543	HANDLE MOUNT, PLATED	2
5.	17058	TUBE CAP, ROUND	3
6.	17177	RETAINING RING, EXTERNAL, 1.00	2
7.	19268	THROTTLE LEVER	1
8.	19411	TUBE, HANDLE	1
9.	19412	HYDRAULIC CONTROL HEAD, COMPLETE	1
10.	19414	BRACKET, SHIFT HANDLE	1
11.	19415	HANDLE BAR, LEFT	1
12.	19416	HANDLE BAR, RIGHT	1
13.	19417	TUBE CAP, SQUARE, 3-1/2	1
14.	19418	PLAIN BEARING, 1.00 I.D.	2
15.	19419	BRACKET, BUMPER MOUNT	1
16.	19420	SHIFT LINKAGE ASSEMBLY	1
17.	19422	CONTROL HANDLE	1
18.	19442	SHOULDER BOLT, 5/16 x 3/4, 1/4-20	2
19.	19519	HANDLE GRIP, 1.00 I.D. x 4-1/2, FOAM	3
20.	19526	SHAFT, CONTROL	1
21.	F023204FSS	FLAT SOCKET HEAD SREW, #8-32 x 1/2, PLATED	2
22.	F0232HN	HEX NUT, #8-32, PLATED	2
23.	F02LW	LOCKWASHER, #8, PLATED	2
24.	F042004FWS	FLANGE LOCK SCREW, 1/4-20 x 1/2, PLATED	2
25.	F0420ELN	LOCK NUT, 1/4-20, PLATED	2
26.	F04PW	WASER, 1/4, PLATED	2
27.	F051804FWS	FLANGE LOCK SCREW, 5/16-18 x 1/2, PLATED	4
28.	F051807FWS	FLANGE LOCK SCREW, 5/16-18 x 7/8, PLATED	2
29.	F0612SP	SPIROL PIN,	1
30.	F061606FWS	FLANGE LOCK SCREW, 3/8-16 x 3/4, PLATED	4
31.	F061608FWS	FLANGE LOCK SCREW, 3/8-16 x 1 PLATED	4
32.	F0813HN	HEX NUT, 1/2-13, PLATED	2
		KITS:	
	19445	HANDLE, COMPLETE (CONTAINS ALL ABOVE ITEMS)	



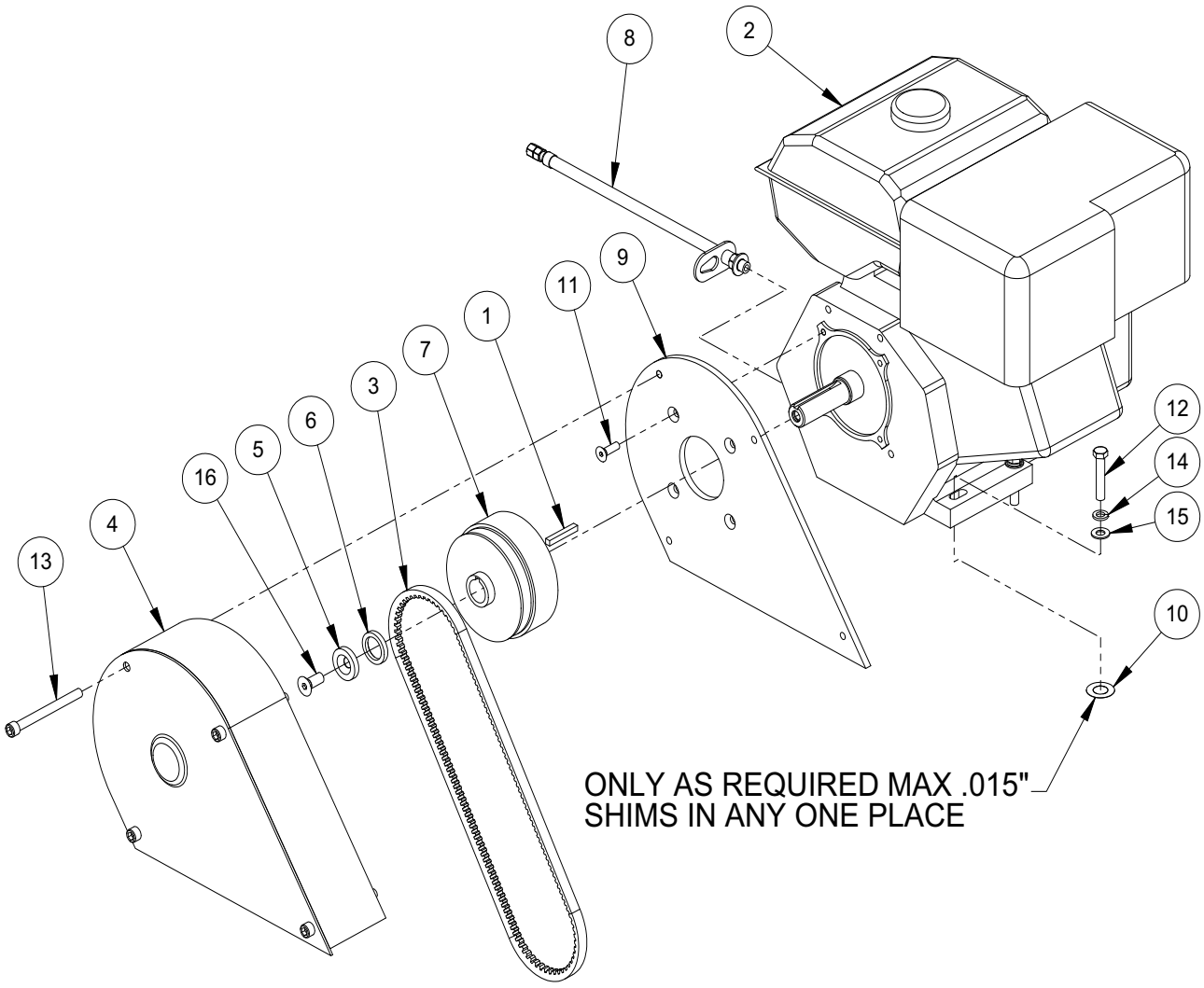
Base Plate Assembly

ITEM	PART NO.	DESCRIPTION	QTY
1.	05559	PLUG, PLASTIC	8
2.	09748	FITTING, PIPE, ELBOW, STR. x 1/8	1
3.	09749	PLUG, BREATHER	1
4.	16382	SHAFT SEAL	1
5.	16386	DOWEL PIN, A8m6 x 65	1
6.	16387	BALL BEARING, #626	2
7.	16388	RETAINING RING, INTERNAL, METRIC	1
8.	16389	E-RING, RETAINING RING, METRIC	1
9.	16390	GUIDERING SEAL	1
10.	16391	WASHER, METRIC, 6.5 x 12 x.5	1
11.	16392	KEY, METRIC, 14 x 9 x 28, ROUND ENDS	1
12.	16393	KEY, METRIC, 8 x 7 x 22, ROUND ENDS	1
13.	16395	ROLLER BEARING, METRIC, 90 x 40	4
14.	16444	BASE PLATE, GPR78 PLATE	1
15.	16446	FITTING, 90DEG.	1
16.	16448	BEARING COVER	1
17.	16453	BEARING COVER	1
18.	16459	BEARING COVER	2
19.	16497	GEAR, INPUT SHAFT	1
20.	16498	GEAR, IDLER SHAFT	1
21.	16499	EXCITER HELIX SHAFT, INPUT	1
22.	16500	PIN CARRIER, HELIX	1
23.	16502	EXCITER SHAFT, IDLER	1
24.	16503	EXCITER WEIGHT, GPR78	4
25.	16505	COVER PLATE, BASEPLATE	1
26.	16545	HYDRAULIC SEAL	2
27.	17023	BLEEDER SCREW, KIT	1
28.	17228	SHIFT SHAFT	1
29.	17229	SHIFT SPOOL	1
30.	17234	GASKET, CYLINDER MOUNT	1
31.	17235	HOUSING, CYLINDER	1
32.	17236	GASKET, CYLINDER COVER	1
33.	17237	CYLINDER COVER	1
34.	17238	CYLINDER MOUNT	1
35.	17469	PULLEY, EXCITER	1
36.	20385	FLAT TORX HD SCREW, 1/4”-20 X 3/4 (S/N 7800001 AND ABOVE)	1
	M06C016FWS	FLANGE LOCK SCREW, M6 x 1.00 x 6 MM., (S/N 3030249 AND BELOW)	1
37.	20386	WASHER, COUNTERSUNK, 1/4 FLAT HD	1
38.	F0410SP	SPIROL PIN, 1/4 x 1-1/4	1
39.	F042004FWS	FLANGE LOCK SCREW, 1/4-20 x 1/2, PLATED	4
40.	F042004HCS	HEX HEAD CAP SCREW, 1/4-20 x 1/2, GRADE 5, PLATED	8
41.	F042008FWS	FLANGE LOCK SCREW, 1/4-20 x 1.00, PLATED	4
42.	F04PW	WASHER, TYPE A 9/32 x 5/8 x 16GA	8
43.	F051804FWS	FLANGE LOCK SCREW, 5/16-18 x 1/2, PLATED	16
44.	F051808FWS	FLANGE LOCK SCREW, 5/16-18 x 1.00, PLATED	16
45.	F061610SCS	SOCKET HEAD CAP SCREW, 3/8-16 x 1-1/4, (S/N 7800035 AND ABOVE)	4
	M10C030SCS	SOCKET HEAD CAP SCREW, M10 x 1.75 x 30, (S/N 7800034 AND BELOW)	4
46.	F0618SPP	PIPE PLUG, 3/8-18	1
47.	F101108SCS	SOCKET HEAD CAP SCREW, 5/8-11 x 1.00 GRADE 8, PLATED	4
		KITS:	
	17347	LOWER HYDRAULIC KIT (CONTAINS ITEMS #9, 26, 29, 30 & 32)	
	16496	BASEPLATE, GPR78 (CONTAINS ALL ABOVE ITEMS)	



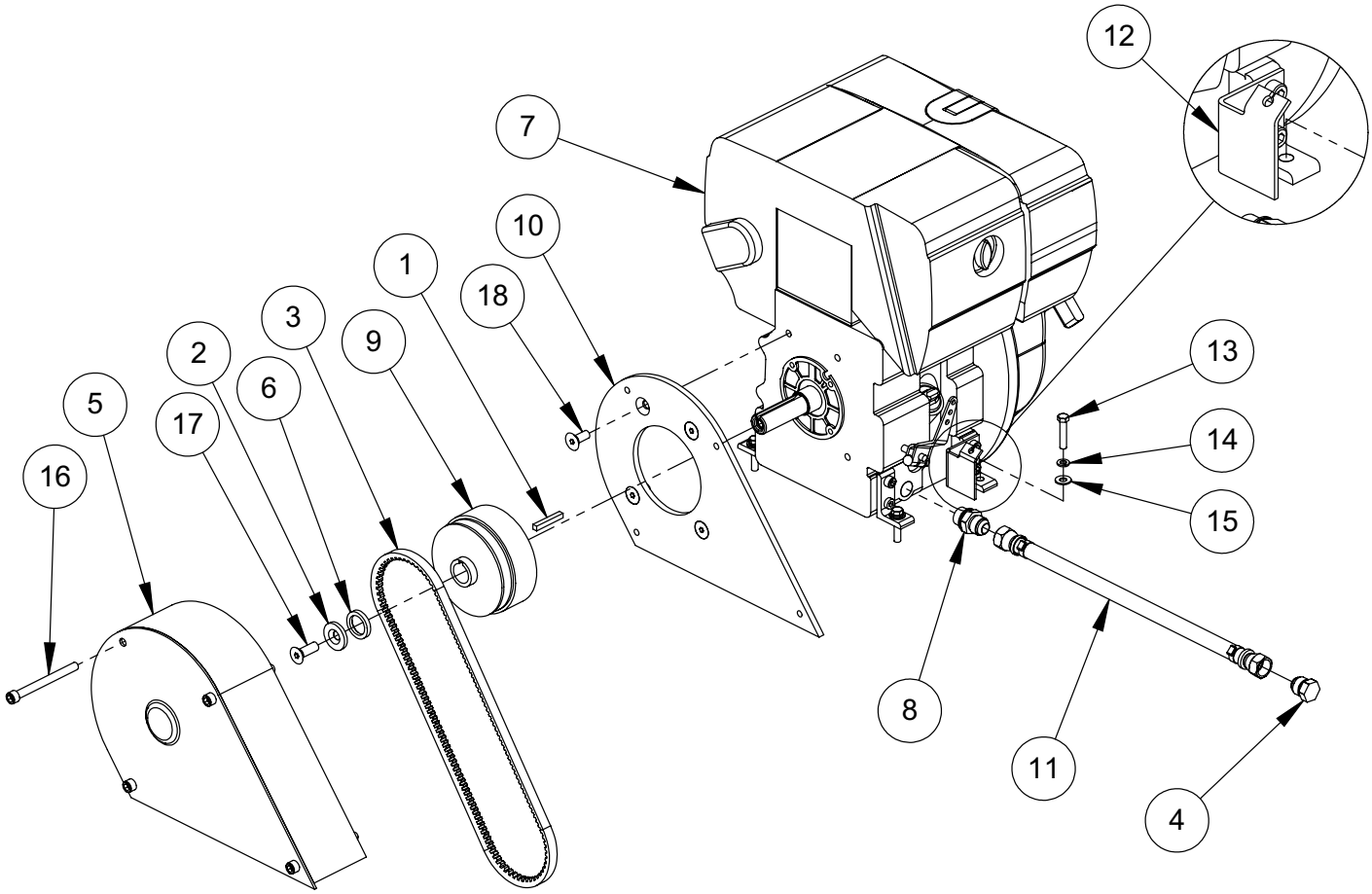
Control Head Assembly

ITEM	PART NO.	DESCRIPTION	QTY
1.	08355	HYDRAULIC FITTING	1
2.	16359	WASHER SEALING, METRIC	1
3.	16404	O-RING, METRIC, 30mm I.D. x 2 mm	1
4.	16468	SLIDE BUSHING	1
5.	16519	HYDRAULIC SEAL	1
6.	17250	FITTING, SOCKET HEAD PLUG	1
7.	19427	HOUSING, CONTROL HEAD	1
8.	19430	SHAFT WIPER SEAL	1
9.	19431	HYDRAULIC SHAFT SEAL	1
10.	19433	BEARING, GUIDE RING	1
11.	19434	BEARING, GUIDE RING	1
12.	19527	PISTON SHAFT	1
13.	19528	SEAL CAP FITTING	1
14.	19529	ADAPTER FITTING	1
15.	F0227SPP	SOCKET PIPE PLUG	1
16.	F1214SPP	PIPE PLUG, 3/4-14 NPTF	1
		KITS:	
	19606	REBUILD KIT, UPPER	



Gasoline Engine Assembly

ITEM	PART NO.	DESCRIPTION	QTY
1.	00808	KEY, 1/4” SQUARE x 1-3/4” LG.	1
2.	15674	ENGINE, HONDA GX270	1
	17440	ENGINE, ROBIN EX270	1
3.	16252	V-BELT	1
4.	16538	BELT GUARD	1
5.	16544	WASHER, CLUTCH	1
6.	16559	SPACER, ENGINE SHAFT	1
7.	16879	CLUTCH	1
8.	16974	LINE, OIL DRAIN HONDA 8HP+	1
	18767	LINE, OIL DRAIN, HONDA/ROBIN	1
9.	17465	BELT GUARD MOUNTING PLATE	1
10.	00259	SHIM, 5/8 I.D. x .005 THICK (MAY NOT BE REQUIRED)	
11.	F052408FSS	FLAT SOCKET HEAD SCREW, 5/16-24 x 1.00	4
12.	F061614HCS	HEX HEAD SCREW, 3/8-16 x 1-3/4, GRADE 5, PLATED	4
13.	F061632SCS	SOCKET HEAD CAP SCREW, 3/8-16 x 4.00, PLATED	4
14.	F06LW	LOCK WASHER, 3/8, PLATED	4
15.	F06PW	FLAT WASHER, 3/8, PLATED	4
16.	F072008FSS	FLAT SOCKET HEAD SCREW, 7/16-20 x 1.00, PLATED	1



Diesel Engine Assembly

ITEM	PART NO.	DESCRIPTION	QTY
1.	00808	KEY, 1/4 SQ. x 1-3/4 LG.	1
2.	14992	WASHER, COUNTERSINK	1
3.	16250	V-BELT	1
4.	16523	FITTING, PLUG, HYDRAULIC	1
5.	16538	BELT GUARD	1
6.	16559	SPACER, 1.375 x1.0 x .218	1
7.	16563	DIESEL ENGINE, HATZ-1B30	1
8.	16578	FITTING, ADAPTER, HYDRAULIC	1
9.	16879	CLUTCH	1
10.	17466	MOUNT, BELT GUARD	1
11.	19623	HOSE, OIL DRAIN, GPR78	1
12.	19483	BRACKET, THROTTLE, ENGINE	1
13.	F051812HCS	HEX HEAD SCREW, 5/16-18 x 1-1/2, GRADE 5, PLATED	4
14.	F05LW	LOCK WASHER, 5/16, PLATED	4
15.	F05SW	PLAIN WASHER, 5/16, PLATED	4
16.	F061632SCS	SOCKET HEAD CAP SCREW, 3/8-16 x 4.00, PLATED	4
17.	F072010FSS	FLAT SOCKET HEAD SCREW, 7/16-20 x 1-1/4, PLATED	1
18.	M10C025FSS	FLAT SOCKET HEAD SCREW,M10 x 25mm	4
		SERVICE ITEMS:	
	H50484100	AIR FILTER HATZ DIESEL	
	H01635210	FUEL FILTER (INSIDE TANK) HATZ DIESEL	

WARRANTY

WHAT DOES THIS WARRANTY COVER? MBW, Incorporated (MBW) warrants each New Machine against defects in material and workmanship for a period of twelve (12) months. "New Machine" means a machine shipped directly from MBW or authorized MBW dealer to the end user. This warranty commences on the first day the machine is sold, assigned to a rental fleet, or otherwise put to first use.

MBW warrants each Demonstration Machine against defects in material and workmanship for a period of six (6) months. "Demonstration Machine" means a machine used by MBW or its agents for promotional purposes. This warranty commences on the first day the machine is sold, assigned to a rental fleet, or otherwise put to first use.

This warranty covers the labor cost for replacement or repair of parts, components, or equipment on New Machines or Demonstration Machines, and MBW shall pay labor costs at MBW's prevailing rate to affect the warranted repair or replacement. MBW reserves the right to adjust labor claims on a claim-by-claim basis.

This warranty covers the shipping cost of replacement parts, components, or equipment via common ground carriers from MBW to an authorized MBW dealer. Air freight is considered only in cases where ground transportation is not practical.

MAY THIS WARRANTY BE TRANSFERRED? This warranty is non-transferable and only applies to the original end user of a new machine or demonstration machine.

WHAT DOES THIS WARRANTY NOT COVER?

1.This warranty does not cover any Used Equipment. "Used Equipment" means any MBW machine or equipment that is not a New Machine or a Demonstration Machine. All Used Equipment is sold **AS IS/WHERE IS WITH ALL FAULTS.**

2.This warranty does not cover any New Machine, Demonstration Machine, or their equipment, parts, or components altered or modified in any way without MBW's prior written consent. This warranty does not cover the use of parts not specifically approved by MBW for use on MBW products. This warranty does not cover misuse, neglect, shipping damage, accidents, acts of God, the operation of any New Machine or Demonstration Machine in any way other than recommended by MBW in accordance with its specifications, or any other circumstances beyond MBW's control. This warranty does not cover any New Machine or Demonstration Machine repaired by anyone other than MBW factory branches or authorized MBW distributors.

3.This warranty does not cover, and MBW affirmatively disclaims, liability for any damage or injury resulting directly or indirectly from design, materials, or operation of a New Machine or Demonstration Machine or any other MBW product. MBW's liability with respect to any breach of warranty shall be limited to the provisions of this document and in no event shall exceed an amount equal to the purchase price of the New Machine or Demonstration Machine purchased from MBW.

4.This warranty does not cover engines, motors, and other assemblies or components produced by other manufacturers and used on a New Machine or Demonstration Machine, as said engines, motors, and other assemblies or components may have warranties provided by the manufacturer thereof. This warranty does not apply to consumable items, such as v-belts, filters, trowel and screed blades, seals, shock mounts, batteries, and the like, all of which are sold AS IS/WHERE IS WITH ALL FAULTS.

5.This warranty does not cover the cost of transportation and other expenses which may be connected with warranty service but not specifically mentioned herein.

6.This warranty does not cover any updates to any New Machine, Demonstration Machine, or any other MBW product. MBW reserves the right to improve or make product changes without incurring any obligation to update, refit, or install the same on New Machines or Demonstration Machines previously sold.

WHAT MUST YOU DO TO OBTAIN WARRANTY COVERAGE? Each New Machine or Demonstration Machine is accompanied by a Warranty Registration Card. You must sign, date, and return the Warranty Registration Card to the place of origin of the New Machine or Demonstration Machine, either to MBW, Inc. at P.O. Box 440, Slinger, Wisconsin 53086, MBW (UK), Ltd. at Units 2 & 3 Cochrane Street, Bolton BL3 6BN, United Kingdom or MBW FRANCE SARL at ZA D'Outreville, 5 Rue Jean Baptiste Neron, Bornel 60540 France, within ten (10) days after purchase, assignment to a rental fleet, or first use. This signed warranty card is the buyer's affirmation that he has read, understood, and accepted the warranty at the time of purchase. Failure to return the warranty card as specified herein renders the warranty null and void. In order to receive warranty coverage consideration, warranty claims must be submitted within thirty (30) days after the New Machine or Demonstration Machine fails. Warranty claims must be submitted to MBW, Inc., MBW (UK), Ltd. or MBW FRANCE SARL, and written authorization for the return of merchandise or parts under the warranty must be obtained before shipment to MBW.

WHAT WILL MBW DO? MBW's obligation under this warranty is limited to the replacement or repair of parts for a New Machine or Demonstration Machine at MBW factory branches or at authorized MBW distributors, and such replacement or repair is the exclusive remedy provided hereunder. Labor must be performed at an authorized MBW distributor. MBW reserves the right to inspect and render a final decision on each warranty case, and MBW's repair or replacement is solely within the discretion of MBW.

IT IS EXPRESSLY AGREED THAT THIS SHALL BE THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY. UNDER NO CIRCUMSTANCES SHALL MBW BE LIABLE FOR ANY COSTS, LOSS, EXPENSE, DAMAGES, SPECIAL DAMAGES, INCIDENTAL DAMAGES, OR PUNITIVE DAMAGES ARISING DIRECTLY OR INDIRECTLY FROM THE USE OF THE NEW MACHINE OR DEMONSTRATION MACHINE WHETHER BASED UPON WARRANTY, CONTRACT, NEGLIGENCE, STRICT LIABILITY, OR ANY OTHER LEGAL THEORY.

THE FOREGOING WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR USE, AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER OBLIGATIONS OR LIABILITY ON MBW'S PART. MBW NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME ON BEHALF OF MBW ANY OTHER LIABILITY OR WARRANTY IN CONNECTION WITH THE SALE OR SERVICE OF ANY NEW MACHINE, DEMONSTRATION MACHINE , OR ANY OTHER MBW PRODUCT.

EXTENDED RAMMER WARRANTY - MODELS R422, R442, R482 & R483.

This extended warranty commences on the last day of MBW's standard, one year, "limited warranty" and runs for an additional four years (48 months). This extended warranty is limited to part replacement and shipping costs of rammer **bellows and non-metallic slide bearings only.** This extended warranty does not cover labor, down time, or any other cost beyond that of component replacement and freight. This extended warranty is subject to all limitations set fourth in MBW's "limited warranty", above.